

Microsoft, DCA To Develop SNA Server for OS/2

BY LAURIE FLYNN

REDMOND, WA — Microsoft Corp. has teamed up with Digital Communications Associates and a British software company to create an SNA communications server for OS/2.

The announcement will be made this Tuesday, according to companies that have been briefed. Digital Communications Associates (DCA) will become the product's first OEM customer.

The product, which will be available only through OEM customers, is Microsoft's alternative to IBM's communications server in OS/2 Extended Edition, providing communications between OS/2 and SNA mainframes.

Coupled with the arrival of SQL Server by the end of the year, **See Microsoft, Page 8**

IBM Shows PS/2 Prototype System Running i486 Chip

BY ALICE LAPLANTE

CHICAGO — One day after Intel Corp. formally announced its next-generation i486 chip, IBM held a "technology demonstration" of a 25-MHz version of the chip running in a PS/2 Model 70.

IBM's entry systems division chief James Cannavino, declaring that he wasn't really announcing a new product in a way reminiscent of how he held up IBM's "Wizard" prototype applications accelerator board at Intel's i860 debut, demonstrated a Model 70-A21 running with a i486 chip set replacing the standard 80386 CPU.

"This is especially exciting because this is not a brand-new design, but our Model 70-A21," Cannavino said. "This is a **See Prototype, Page 105**



Sun's SPARC-Station 1, at \$8,995 for 12½ MIPS, has 8-bit digital audio, real-time video, and fast 2-D and 3-D graphics.

SPARC-Station 1 Leads Chorus of Sun Products

Graphics Accelerators Improve Expandability

BY MARTIN MARSHALL

The long-awaited new products from Sun Microsystems Inc. were unveiled last week and feature greater MIPS power, competitive price/performance, advanced graphics, 3-D rendering, true 24-bit color, and real-time video manipulation.

The star of the show was the SPARC-Station 1. Priced at \$8,995 for a diskless system with 8 megabytes of RAM and a 17-inch monochrome monitor, the SPARC-Station 1 claims 12½ MIPS, compared to about 14 MIPS and a \$11,900 base price for the DEC-Station 3100.

There were also two workstations and three servers that were all based upon a 16-MIPS SPARC chip from Cypress Semiconductor.

MIPS comparisons, however, are not the most important difference between the Sun and DEC entry-level RISC offerings. Expandability and graphics will be Sun's main selling points. The company introduced its new S-Bus for plug-in expansion and its GX and GXP lines of high-performance graphics ac-

celerators for both SPARC-based and Motorola 68030-based machines.

The S-Bus is a 32-bit bus with direct memory access (DMA) to system RAM and is capable of transferring 32 megabytes per second.

There are three S-Bus expansion connectors in the SPARC-Station 1, each of which allows a 3-by-5-inch card to be mounted parallel to the motherboard to maintain a low profile. Double-**See Sun, Page 105**

HP Purchases Workstation Vendor Apollo

Stealing some thunder from last Wednesday's Sun Microsystems product announcements, Hewlett-Packard Co. of Palo Alto, California, announced that it would purchase rival Unix workstation vendor Apollo Computer for approximately \$500 million.

Apollo, which is based in Chelmsford, Massachusetts, will become a part of HP's workstation group, according to HP.

Hewlett-Packard officials said that it will be a few days before they will be able to look at Apollo's product **See Apollo, Page 8**

IBM to Provide Remote Data Services for DOS

Enables Users to Move to OS/2 Gradually

BY ALICE LAPLANTE
AND ED SCANNELL

CHICAGO — In a subtle strategy shift, IBM said it is committed to providing Remote Data Services for DOS under OS/2 Extended Edition, making it possible for users to bring OS/2 into their networking environments gradually.

In the past, it appeared that all workstations running IBM software would need to run OS/2 in order to take advantage of Extended Edition's data access facilities. Remote Data Services for DOS, however, will make it possible for network sites to introduce Extended Edition on the server while workstations continue to run under DOS.

By placing more emphasis on OS/2 as a server product and

allowing DOS users to download data from the OS/2 server via Remote Data Services, users can get a less-expensive taste for the environment before committing to it in larger volumes.

"A server [running OS/2] is a good place to start. It's a good strategy," said Lee Reising, director of IBM's software strategy. "You have to be careful not to overdo it [Remote Data Services for DOS] because the DOS world is constrained. But it is a good way to move to OS/2 gracefully, as each user needs it."

Reising admits that most corporations will have a mixed DOS-OS/2 environment for a long time to come. He believes, however, that month-to-month sales of OS/2 should surpass **See Remote, Page 105**

IBM Shows New Third-Party MCA Bus Master Products

BY ALICE LAPLANTE

CHICAGO — Spring Comdex saw IBM once again extolling the virtues of its Micro Channel Architecture by holding bus mastering "technology demonstrations" and heralding third-party bus master product availability.

At a press briefing, IBM said over 2,000 MCA IDs have been given out worldwide, with 300 companies announcing over

1,000 MCA cards. Twelve of those are bus master cards, said Bob Carberry, IBM's vice president of systems strategy, who added that 175 bus master IDs have been issued worldwide.

A bus master card acts as an intelligent subsystem that includes a dedicated processor that in combination with a bus controller and support logic is able to intelligently monitor a process or task independent of **See Bus Master, Page 8**

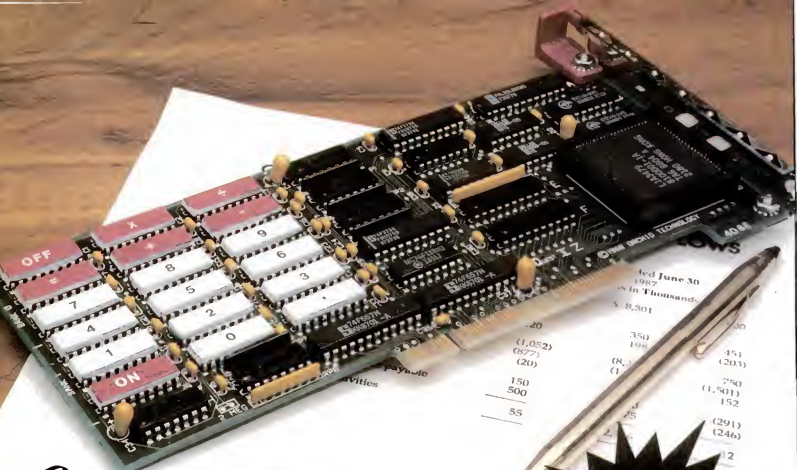
AT DEADLINE

Intel, Prime to Develop ECL Version of i486

Intel Corp. of Santa Clara, California, announced last week that it has signed a letter of intent to undertake a joint development with Prime Computer Inc. to produce an emitter coupled logic (ECL) implementation that will boost performance of the newly introduced i486 eightfold.

Prime will incorporate its proprietary ECL and cooling technologies into the design of an i486 processor module, Intel said. A Prime ECL i486 implementation should be available in 1992 and should run at 120 MIPS, said Gordon Moore, Intel chairman.

Continued on Page 3



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Maximum Memory	8MB	2MB	8MB
Standard Configuration	0K, 512K 1MB, 2MB	0K, 2MB	0K, 512K 1MB, 2MB
OS/2, EMS 4.0 & DOS Backfill	Yes	Yes*	Yes*
Bus Support	8 and 16 bit operation	16 bit operation	16 and 32 bit operation
Installation	Switchless and Software Setup	Switchless and 4 Keystrokes	Switchless and 4 Keystrokes
Serial/Parallel Port	Optional	No	Yes
Uses 256K and 1MB SIMMs	Yes	1MB DRAMs	Yes
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* DOS Backfill on Models 50 and 60 gives zero wait-state for system memory and up to 50% speed increase.

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AT DEADLINE Continued From Page 1

The proposed agreement calls for Intel to market the ECL processor that Prime has the right to use in its own systems.

The ECL modules will be bit-compatible with the Intel i486 microprocessor, according to Prime.

— Ron Copeland

EISA 33-MHz 386 System Proposed

Tulip Computers UK PLC announced its intention to bring a 33-MHz 386-based computer with an EISA bus to the market by the fourth quarter.

The British company said that for the full potential of the 33-MHz processor to be realized, the current ISA bus is not sufficient. Direct Memory Access (DMA) using an AT-compatible bus is only 2 megabytes per second, but the company said speeds of 32 megabytes per second could be achieved with the EISA architecture.

Specifications were not released, but the machine will have advanced cache memory, high capacity, fast access to hard disks, and expansion capabilities on the motherboard and within the CPU.

— Yvonne Lee

Seiko to Sell Low-Cost Color Printer

Seiko Instruments U.S.A. Inc. is scheduled to unveil this week at the National Computer Graphic Association (NCGA) Exposition a Postscript-compatible color printer that will sell for less than \$5,000.

The product, called the iCH350-PS Color Thermal Printer, matches Seiko's 240-dot-per-inch thermal print engine with the Freedom of Press Postscript language interpreter from Custom Applications Inc.

Freedom of Press runs on AT-class PCs and PS/2s and works with Bitstream fonts.

The printer is rated to print at one page per minute and comes in two models with different page buffer sizes for \$4,995 and \$5,995.

— Bob Fonting

Tops Ships Appletalk Chip Samples

In a move designed to promote the manufacturing of PC compatibles with network capability built-in, the Tops division of Sun Microsystems Inc. is now shipping samples of a \$3.65 single-chip Appletalk controller, according to sources close to the company.

The Flash Chip, which will ship in August, will allow manufacturers of personal computers and printers to inexpensively build compliance with Appletalk-compatible networking schemes directly into their hardware, according to sources.

The chip will allow PCs to communicate at up to 770 kilobits per second and will support software including AppleShare, Novell Netware, Tops' own FlashTalk, and any other Appletalk-Filing-Protocol-compatible software, including upcoming versions of 3Com's 3+ and 3+ Open LAN Manager.

— Mark Stephens

Microsoft Offers Free DOS 4.01 Fix

Microsoft Corp. is offering a free fix for an obscure bug in some releases of MS-DOS 4.01 that can, if invoked, destroy data.

The bug apparently occurs only if the user allocates buffers with secondary cache, uses partitions greater than 32 megabytes, and performs a certain sequence of operations, according to Microsoft. When a user calls a file that is partly stored past the 32-megabyte range and immediately follows with an operation that prompts the system to read a FAT (File Allocation Table) section, the bug causes data to be lost, according to Microsoft.

The fix — already implemented in copies of DOS shipped after April 7 — is also posted for downloading as DSPATCH.ARC in Data Library 1 of Microsoft's Compuserve forum.

— Peggy Watt

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See DOS run.



*Look at DOS. It looks back at you.
It makes you do all the work.
You need the Norton Commander.*



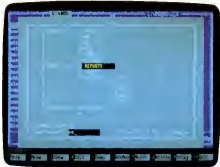
*See this user-defined menu.
It runs your favorite programs and
routines at a keystroke.*



*View two directories—from one or
two disks—at once.
And move your files around quickly.*



*Pull down a menu for quick,
easy access to the full power and
features of the program.*



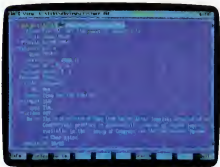
*Want a tree view? Just pop
up a window. You can scroll, mouse
or Speed Search for directories.*



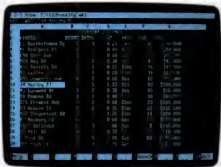
*To see your files, pick a
directory on the left and see the
contents on the right.*



*Remember your last 15 commands?
Our Command History does.
Take your pick and run them again.*



*View your dBASE® II or III data
without having to run dBASE.
It's as close as a keystroke.*



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Peter Norton
COMPUTING



**NORTON
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NEWS

Apple's 32-Bit Quickdraw Set for NCGA Introduction; Scalable Fonts Are Next

By Bob Ponting

PHILADELPHIA — Apple Computer Inc. is scheduled to announce today its long-awaited 32-bit Quickdraw for the National Computer Graphics Association Exposition (NCGA) here.

The system enhancement will bring workstation-level photo-realism to the Macintosh world and allow such video card vendors as Radius, Rasterops, and Supremac to ship the 24-bit display cards announced at January's Macworld.

In a related development, an upcoming Quickdraw will support scalable outline fonts, an Apple official said. The font-scaling feature requires 1 megabyte of RAM and provides capabilities similar to Adobe's Display Postscript, said Cynthia Macon, Apple spokeswoman.

Some industry observers expect Apple to announce outline font support at its spring Developer Conference in early May.

The 32-bit Quickdraw upgrade will be available in May free from Apple dealers and user groups and with products that require 32-bit color support, said Laurie Girand, Apple prod-

uct manager. It is packaged as three files — Quickdraw, A Monitors file, and a General file — and takes an additional 120K of RAM. It will also be folded into System 7.0 of the Mac OS and placed in ROM on future versions of the Mac.

The 32-bit Quickdraw uses 24 bits for color, giving Mac applications access to more than 16 million colors. Developers can use another 8 bits for special effects.

The new Quickdraw supports an enhanced 32-bit PICT II file format, as well as 16-bit color graphics. It also supports scaling of 24-bit images to 16- and 8-bit displays, as well as automatic dithering of 16- and 24-bit graphics to achieve closer color matching on 8-bit displays. The upgrade also provides the Laserwriter 6.0 printer driver that supports color and monochrome Quickdraw output on Postscript printers, PICT file compression, and an improved Palette Manager.

Enhanced Quickdraw runs



32-bit Quickdraw, shown here on a Radius monitor, will be folded into System 7.0 and placed in ROM on future Mac versions.

on Macs with a 68020 or 68030 processor and requires System 6.0.3 or later. Apple recommends at least 2 megabytes of RAM.

Radius Inc. of San Jose, California, will ship its 16- and 24-bit Direct Color display cards this quarter for \$3,695 and \$4,995.

Supremac Technology of Mountain View, California, announced its 24-bit Spectrum/24 video card will cost \$3,999 and ship when 32-bit Quickdraw is released. Owners of Nubus-compatible color cards from Supremac, Apple, and Rasterops can trade their cards to buy the Spectrum/24 for \$2,499.

— Laurie Flynn contributed to this story.

Metaphor Sues Xerox In Interface Dispute

By Martin Marshall

SAN JOSE, CA — Metaphor Computer Systems Inc. filed suit last month against Xerox Corp. after receiving two letters from Xerox accusing it of software copyright infringement and demanding compensation.

In the suit, which was filed in U.S. District Court here, Metaphor is asking a federal judge to remove the threat of legal action by Xerox by declaring that Metaphor's graphical operating system does not violate any of Xerox's rights.

The first letter, which was sent in February, informed Metaphor that Xerox attorneys had concluded that "the software being marketed by Metaphor infringes Xerox's proprietary rights," and asked that Xerox "be appropriately compensated for past and future uses of Xerox proprietary rights."



Metaphor's David Liddle said his firm has been negotiating with Xerox for several weeks.

The second letter, sent in March, stated that "continuing use of the system by Metaphor would require a license from Xerox."

What is not clear is exactly which technology is in dispute. According to a Xerox official, who asked not to be named, it is the technology used in the Xerox Star, an experimental computer developed at Xerox's Palo Alto Research Center (PARC), which first featured the use of a mouse, as well as a point-and-click graphical user interface.

These features were later adopted and popularized by Apple Computer Inc. in its Macintosh line of computers.

David Liddle, Metaphor CEO, was manager of Xerox's office products division when it introduced the Xerox Star in 1981.

Xerox officials would not comment on the substance of the suit or say why it has waited so long to assert its rights to the Star technology. But they did confirm that the only previous licensing for the technology was in a recent exchange agreement with Sun Microsystems Inc. and in an earlier agreement with Apple that covered the Small-talk programming environment used in the Star.

Xerox officials also confirmed that negotiations with Metaphor have been underway for several weeks.

— Yvonne Lee contributed to this story.

Xerox Unveils Ventura Publisher Version for OS/2

By Bob Ponting

CHICAGO — Xerox Corp. demonstrated an OS/2 Presentation Manager version of Ventura Publisher at Comdex here last week and slashed the price of adding Ventura users to a network.

Ventura Publisher for OS/2 will have all the features currently available under DOS in Version 2.0 and the Professional Extension, as well as OS/2-specific capabilities such as support for multiple program threads, Xerox said. It also uses the multitasking environment

and will exchange text and graphics with other applications through the window interface.

When the product ships later this year, it will have more features not available under DOS, said John Meyer, Ventura Software's president. "This will be a significant new product, as opposed to just the same thing on a different environment," he said.

Xerox expects Ventura for OS/2 to ship by the end of 1989, but Meyer said it may be ready in the third quarter. Price and packaging has not been determined.

Also introduced for release this month was the Xerox Ventura Publisher 2.0 3-Pak Net Workstation, which supports three simultaneous users under the Ventura Network Server. It costs \$995, a \$1,690 savings over buying three individual products for use with the Server, according to the company.

Xerox also announced a marketing and development alliance this year, said Bryan Schaffer, product manager at developer MDBS of Lafayette, Indiana. It features a programming language and window painter. Polymod 2, from Southeastern Office Products and Services Corp. of Boca Raton, Florida, is available now for \$1,600. It lets OS/2 support up to eight local or remote users sharing standard

Presentation Manager Applications Sparse at IBM's Comdex Showcase

By Peggy Watt

CHICAGO — Again showcasing OS/2 applications, IBM's product lineup at Comdex last week offered few new entries and even fewer Presentation Manager programs that can be found on retailers' shelves.

Among the announcements were Object 1, an object-oriented application development system for Presentation Manager, and Polymod 2, which makes OS/2 1.0 applications multiter. Object 1 will ship as a development kit in June or July and as a \$1,000 production version late this year, said Bryan Schaffer, product manager at developer MDBS of Lafayette, Indiana. It features a programming language and window painter.

Polymod 2, from Southeastern Office Products and Services Corp. of Boca Raton, Florida, is available now for \$1,600. It lets OS/2 support up to eight local or remote users sharing standard

OS/2 applications.

Xerox showed an implementation of Ventura Publisher under OS/2 1.1. (See related story, this page.)

Also shown were Presentation Manager products CASE.M, a development tool from Caseworks Inc. of Atlanta, and information manager Packrat from Polaris Software of Escondido, California. Final versions of both are scheduled to ship next month. (See "IBM to Host Display of PM, OS/2 Applications," April 10, page 12.)

"In three months, you'll probably see 10 Presentation Manager applications shipping," said Mark Mackaman, Microsoft's OS/2 product marketing manager. He said more than 850 OS/2 applications are announced, 370 of which are shipping and three of which are PM programs.

— Laurie Flynn, Stuart J. Johnston, and Scott Mac contributed to this report.

Sony Demonstrates 60-Hz Trinitron Hi-Res Monitor Offering .25 Dot Pitch

CHICAGO — An upcoming addition to Sony Corp.'s line of high-resolution Trinitron monitors offers high resolution and a 60-hertz refresh rate.

The monitor was demonstrated last week at spring Comdex using the Super VGA

graphics adapter card from Genoa Systems Corp. The \$1,099 monitor, called the Superfine Pitch CPD-1304, features 1,024-by-768-pixel resolution and .25 dot pitch.

Genoa's Super VGA Model 6300 card can be automatically configured for an 8- or 16-bit bus. Configured with 256K of memory, the card supports 16 colors in non-interlaced 1,024-by-768 resolution. With the addition of another 256K of memory, the card can be upgraded to the Model 6400 to display 16 colors on interlaced and non-interlaced monitors.

The 6300 is \$499, while the 6400 is \$699. A low-end 8-bit VGA-compatible adapter, the 6100, is \$429. The products are scheduled for release in August.

— Laurie Flynn



Sony's Superfine Pitch CPD-1304 monitor features 1,024-by-768-pixel resolution.

IBM Joins the Windows Presentation Manager Association

BY ED SCANNELL

IBM officially recognized the strategic importance of Microsoft Corp.'s Windows last week by joining the Windows Presentation Manager Association.

IBM wants to accelerate acceptance of OS/2 and the Presentation Manager by working more closely with the Association's cross-section of Windows and Presentation Manager developers, according to an official statement.

The move doesn't represent any fun-

damental shift in corporate strategy, as IBM remains firmly committed to what it believes are Presentation Manager's superior capabilities, officials said. However, IBM sees Windows as a "low end" graphical solution, according to Lee Reiswig, software strategy director for IBM's entry systems division.

"About one-third of the developers we talk to are writing for Windows, but mostly they are writing for PM," he said. "I think it [Windows] represents a good low-end solution for some customers."

Some developers said IBM's membership shows at least a mild shift in its attitude toward Windows, due mostly to slow acceptance of OS/2 and Presentation Manager. They said IBM has underestimated Windows' market opportunity.

"With DOS looking like it will be around for a few years, I think IBM realizes there is a lot of money to be made with Windows over the next few years," said one developer.

"This fall, you'll see a number of OEMs shipping DOS and Windows

together," said Russ Warner, general manager of Microsoft's DOS and Windows business unit. "I'm not saying who, but I think you'll see significant penetration. We have 50 percent penetration in Europe." (See "Windows May Be Brought to DOS," March 13, Page 19.)

Reiswig and other IBM officials said IBM joined WPM for contact with smaller developers. IBM has bought rights to two Windows-based programs in as many months. The first was Publishing Solutions Inc.'s graphics engine, code-named Hollywood; and, last week, Jensen-Jones Inc.'s Currents, a personal information manager. (See "IBM to Offer Windows Information Manager," Page 8.)

IBM wants to acquire other graphical applications, most notably a word processor, said Fernand Sarraz, general manager of IBM's desktop software group.

—Stuart J. Johnston also contributed to this report.

A family Tree with impressive roots.



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Nantucket Tries To Quell Fears Over Clipper Kit

BY MARK BROWNSTEIN

MANHATTAN BEACH, CA — In the wake of developer complaints about its Clipper Applications Toolkit, Nantucket Corp. executives met privately with third-party developers here last week to reassure them of a continuing opportunity in the aftermarket and to include them in Clipper marketing strategy.

Developers would neither confirm nor deny that Nantucket called the meeting to appease their outcry at Nantucket's announcement of a Clipper Applications Toolkit that competes in the accessories market. However, most said they view the meeting as Nantucket's attempt to show concern for third-party developers, and invite them to help plan Clipper promotion strategy.

Nantucket's announcement was seen as a threat to independent developers' market share, said Al Acker, editor of *Reference(Clipper)*, a publication for the Clipper development community.

"Absolutely everybody in the aftermarket discussed this," said one developer. Most of the developers were upset with Nantucket's decision.

Nantucket summoned developers and paid their way to the meeting, which was called to develop "a significant alliance" between the aftermarket developers and Nantucket, according to a formal statement released after the meeting.

Attendees said they agreed to draft proposals for a relationship between Nantucket Corp. and the aftermarket developers.

The meeting was a "real first" because of the level of involvement between Nantucket and the development community, said one developer who attended. Nantucket expects the meetings will develop "a blueprint that the rest of the industry will follow," said Larry Heimen-dinger, Nantucket's president.

The group acknowledged that it plans to hold additional meetings, and speculated that a product or products may result from the alliance.

IN ALL FAIRNESS, YOU SHOULD READ WHAT ASHTON-TATE® IS SAYING BEFORE YOU PURCHASE ORACLE.

Ashton-Tate Fights SQL Bugs Same Query Run Twice Can Result in Different Replies

Ashton-Tate last week acknowledged that the Structured Query Language (SQL) portion of dBASE IV can produce inconsistent and inaccurate results.

The crux of the SQL problems lies with three anomalies that occur when data is structured in a specific way, according to Krenz Richardson, a spokesman for the Torrance, Calif., firm. As a result, the same query run two different times can result in two different replies, for example, or a query

can retrieve incomplete information from the database. (See Chart, Page 8.)

Ashton-Tate does not plan to issue a diskette to fix the problem; it is, however, offering work-around solutions to users through its support lines and bulletin board, and on CompuServe.

Richardson said. Though Ashton-Tate is characterizing dBASE IV's SQL problems as "minor" and confined to specific circumstances, database experts claim their impact is more serious.

"The SQL in dBASE IV is unstable, unreliable and unpredictable," said Richard Finkelstein, president of Performance Consulting Inc., a database consulting firm in Chicago.

"I don't see how anyone can use it," he added. "They'd have to know the answer to the SQL query ahead of time."

Surprisingly, the majority of dBASE users were unaware by dBASE IV's SQL glitches. The drawbacks in SQL are an

See DBASE Page 8

PC Week, January 9, 1989

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Apollo

Continued From Page 1

plans in detail and decide which projects and products to keep and which to jettison.

"Most of the staff will remain intact in Chelmsford," said Dick Watts, director of marketing for HP's computer products sector. "We'll move quickly to merge the field sales and service organizations under HP. Products close to market, like the 68040 platforms, will appear as scheduled, while products still in the investment phase will require a closer look."

Analysts were uniformly upbeat on the deal. "Apollo has been a big presence in some markets, particularly mechanical CAD, where HP hasn't penetrated," said Bob Tasker, senior vice president of International Data Corp., Inc., in Framingham, Massachusetts.

"[The merger] makes economic sense," agreed Peter Schleider, a Unix analyst at Wessels, Arnold & Henderson, a securities firm in Minneapolis. "There is some synergy of overlap, but there will be efficiencies from eliminating some research and development efforts at Apollo. Apollo has been a poorly run company the past couple of years."

IDC's Tasker estimated that the merger will make HP No. 1 in workstations, up from a distant fourth. According to 1988 IDC figures, Sun Microsystems holds a 34 percent market share, followed by Apollo with 22 percent, DEC with 19 percent, and HP with 13 percent.

Not surprisingly, Sun Microsystems CEO Scott McNeely predicted problems ahead for the combined Hewlett-Packard/Apollo. "The merging of HP and other technologies will be difficult," he said. "We know how difficult that can be from our work on the System V.4 merged operating system. They are going to go with [Apollo's] Prism or [HP's] Spectrum RISC tech or other companies' as they go with. Which networking strategy will they choose? Which divergent Motorola architecture will they go with, and whose graphics libraries will they use?"

Apollo spokesman Jim Barabaggio said that both HP and Apollo are members of the Open Software Foundation and that HP will support Apollo's Domain operating system users until both product lines are phased out of the upcoming OSF/1 Unix variant.

Hewlett-Packard was not Apollo's only suitor. Nixdorf and Siemens from West Germany and Data General of Westboro, Massachusetts, showed some interest, analysts said. AT&T also looked the company over before buying a stake in Apollo's archival Sun Microsystems, they said.

— Barbara Darrow & Martin Marshall

PRODUCT SPOTLIGHT



Akkord Technology Inc. said it plans to enter the U.S. market this summer with a Macintosh-compatible computer using ROMs it has created by reverse-engineering. To date, no company has successfully marketed a true Mac clone, but Akkord officials say they're confident their ROMs will be proven legal. (Current compatibles use original Apple ROMs.)

"Soon or later someone would do it," said Akkord executive director Marc Hara. Why Akkord? "The risk is there, but so is the opportunity. The PC-compatible [market is] no longer practical." Akkord's Mac-compatible computer is based on the 68000 microprocessor, although a 68020-based model is also planned.

— Laurie Flynn

Cogent Claims Fastest LAN Manager

By Stuart J. Johnston

A Washington state company is shipping what it claims is the fastest version of Microsoft Corp.'s OS/2 LAN Manager network operating system available — with a data transfer rate as much as 2½ times faster than others.

Cogent Data Technologies Inc., headquartered on scenic San Juan Island in Puget Sound, has developed a hardware and software solution that aims to eliminate "all system bottlenecks," providing throughput of 1 megabyte per second, said executive vice president Deanna Anderson.

The speed increase in Cogent's LAN Manager 286 is due primarily to a highly optimized Netbios stack, which — unlike other companies' — does not move data in

memory when handling protocol handshakes between one machine's session layer to another's session layer. Instead, only the pointers to the data locations are moved as communications traverse the protocol stacks, greatly speeding throughput, Anderson said.

"We move the data into one buffer, then just change pointers, eliminating memory to memory moves," Anderson added.

Typical transfer rates for other LAN Manager versions are 400 kilobytes per second or less, Anderson said.

Cogent's LAN Manager product lists for \$2,495, which is \$500 less than 3Com Corp.'s 3+ Open LAN Manager, Anderson said.

Additionally, the company offers the Eln7000/AT Bus Master, a \$695 Ethernet board

IBM to Offer Windows Information Manager

By Ed Scannell

CHICAGO — IBM's desktop software group last week bought exclusive marketing rights to Currents, a personal information manager developed by Jensen-Jones Inc. of Red Bank, New Jersey.

Viewed as a competitor of Lotus Development Corp.'s Agenda, the unreleased Currents helps users organize personal and business information from a variety of sources, including calendars, meeting schedules, and corporate databases.

The product was unveiled at a Microsoft conference of Excel developers last year and had been directly between January. (See "Firms Show Off Windows Applications Using DDE," December 5, 1988, Page 5.)

IBM and Jensen-Jones will

jointly enhance Currents by improving or adding features and making it easier to use, said Carmine Cordella, program manager of product strategy and acquisitions for IBM's desktop software group. Cordella declined to specify how the two companies will enhance the product.

"One of the reasons we decided [to buy Currents] is its flexibility," Cordella said. "You can create templates to do the way you work. It allows users to easily transition through the novice to intermediate to advanced stages of use."

Cordella said IBM will market both Windows and Presentation Manager versions of Currents, but declined to say when they will ship. Jensen-Jones had just begun work on a Presentation Manager version when it signed with IBM.

Because the program was designed to be used with networks, it would be easy to position Currents as a work-group product.

Bus Master

Continued From Page 1

the central processor.

Pacific Imaging showed its Superfax bus master product: a fax board that can transmit and receive faxes in the background while continuing other tasks. The \$995 card is currently available under Windows; an OS/2 PM version will be released by the end of the year, according to the firm.

Emphasizing that it was only a technology demonstration, IBM showed the Pacific Imaging Superfax card in a PS/2 to illustrate multifunction MCA bus mastering capabilities. Fax transcending, scanning features, and printing options were combined on a single MCA card.

The Superfax demonstration also featured an Image Adapter/A card that lets both a scanner and a printer be simultaneously attached via an optional printer/scanner daughter card. While the Image Adapter/A is an announced product, it is currently only available on larger IBM systems.

BICC Data Networks Inc. also demonstrated its 4110-3 Ethernet Card, the first MCA Ethernet controller card to employ bus mastering capabilities, on a Model 70. The \$595 card is now shipping.

This is the first Ethernet bus master product to reach the market. Card, the first MCA card, adding that the product is significant in its low price. Previously, observers had expressed concern that bus master technology for the MCA would be prohibitively expensive.

Microsoft

Continued From Page 1

month, the communications server is expected to help accelerate LAN Manager application development and customer acceptance. "We expect these to open the floodgates," said 3Com vice president Eric Benhamou.

Microsoft's product is based on technology from Data Communications Ltd. (DCL) of Enfield, England, which sells the Systems Network Architecture Portable (SNAP) software for SNA bus communications. DCA also contributed to the development with its Select Communications Server providing SNA communications.

In addition to IBM and

DCA, 3Com Corp. and Attachmate both offer SNA communications servers to their own customers. Microsoft's product is compatible with 3Com's Maxx communications server, using the same APIs. "If you take one of ours and one of theirs and hook them up on the same wire, they will be interoperable," Benhamou said.

Microsoft vice president Steve Ballmer would not comment on his company's plan for the product.

3Com's Maxx has been available for DOS clients since last fall, and it provides SNA 3270, APPC, and Netview network management communications. According to Benhamou, 3Com is the only company providing APPC and 3270 communications in one package.

for 80286- and 80386-based AT compatibles that uses bus mastering to allow burst data transfers directly between the controller and the host PC's cache RAM.

The \$595 HDC9000/AT Disk Master hard disk controller card further maximizes system throughput by supporting disk transfer rates up to 10 megabytes per second. It supports the ST506 hard disk interface as well as the Enhanced Small Device Interface (ESDI).

The company is also working on versions of both cards for the Micro Channel Architecture (MCA) and Extended Industry Standard Architecture (EISA) buses, according to Charles Anderson, Cogent's chairman and CEO.

MCA boards will come first in September — because PCs are already available with that bus, Anderson said. EISA bus cards are targeted for November shipment, but that will depend on when the first EISA machines appear, he added.

Besides the company's own Ethernet card, Cogent's LAN Manager product supports Arcnet and Omninet cards. Cogent already supplies its Netbios stack to Arcnet vendor Standard Microsystems Corp. and Omninet's Corvus Systems Inc. for use on those networks.

Additionally, the company will support Token Ring and is considering support for 3Com's network adapters, Anderson said.

"It's clear our Netbios could significantly enhance those cards," he added.

Cogent Data Technologies Inc., P.O. Box 926, Friday Harbor, WA 98250, (206) 378-2929.

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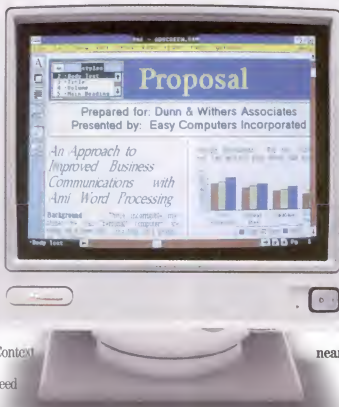
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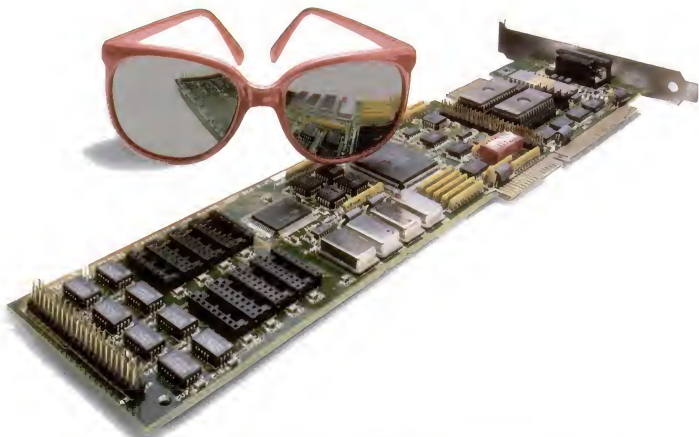
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NETWORKING

Xircom Ethernet Card Uses PC's Parallel Port

\$695 Product Offers Laptops LAN Access

BY PATRICK DRYDEN

CHICAGO — An external Ethernet adapter the size of a cigarette pack, scheduled to ship this month for \$695, provides LAN access for laptop or desktop PCs via any parallel printer port, Xircom Inc. officials said at Comdex last week.

Although conceding that the adapter's use of the parallel port has speed disadvantages, Xircom officials said their Pocket Ethernet Adapter makes up for this with several features.

The adapter allows quick LAN connection for any laptop, including those with full internal slots or for those not supported by other vendors, said Xircom president Dirk Gates. "Toshiba doesn't support the T1000 with its internal Ethernet adapters, and many users of single-slot

laptops install modem cards," Gates said.

"It's still faster to pull files off a LAN than from a T1000 floppy disk," Gates said. Network access speed is 500 kbps on an AT-class host. A \$100 option expands its internal 8K buffer to 32K to improve throughput with slower hosts. It also with frequently moved desktop systems and those with full slots and DMA channels or interrupts dedicated to other functions can also appreciate the external parallel connection, Xircom said.

The new adapter includes drivers for Novell Netware, Versions 2.0 and 2.1, with support for 3Com and TCP/IP coming later in the year, Gates said.

The device also includes an external AC adapter that can shut itself off when it senses that the host's power is down, ac-



The Pocket Ethernet Adapter lets laptops access LANs through parallel printer ports.

ording to Xircom.

Models include either a BNC coupling and T connector for thin Ethernet or MAU connection for an external thick Ethernet transceiver or twisted-pair configuration.

Xircom Inc., 22231 Mulholland Highway, Suite 114, Woodland Hills, CA 91364; (818) 884-8755.

Datapoint Plans Arcnet Speed Enhancements

BY PATRICK DRYDEN

CHICAGO — A major enhancement to Arcnet now under development at Datapoint Corp. may give the local area network a lead in its speed contest with current Token Ring and Ethernet implementations.

Company officials at Comdex acknowledged they are working on a faster version of the 2.5-mbps token passing protocol Datapoint introduced in 1977, which other Arcnet industry sources said would reach 20 mbps and be unveiled this summer.

"We are working on high-speed Arcnet," said Datapoint CEO Robert Potter, who would not say when the new Arcnet specification would appear. "One of the mistakes Datapoint made in the past was preannouncing products," Potter said.

Arcnet Trade Association spokesman Ben Wolfe said his group might have a big announcement this summer, possibly in July.

Wolfe said that any speed enhancement would be backward-compatible and capable of supporting mixed devices in the same network. Boosting Arcnet speed won't leave current sites behind as long as the Arcnet Trade Association — made up of product designers, suppliers, and major users — works together, Wolfe said.

"We don't want to make the same mistake as Token Ring and other systems that require a site to scrap all existing hardware just to boost transfer speeds," Wolfe said.

Enhanced Arcnet cards will switch between the usual 2.5-mbps transmission rate and the 20-mbps rate, Wolfe said. Existing Arcnet networks will be able to add enhanced cards to file servers and high-transaction nodes, such as stations used for constant database activity.

The expected start of this product by the end of the year, said Carmi Humes, marketing director at Thomas-Conrad Corp., an Austin, Texas-based Arcnet vendor.

Hyper Access/5 Utilizes OS/2's Features

BY JEFF ANJOS

CHICAGO — Challenging industry analysts' claims that most OS/2 applications are simply DOS "ports," Hilgraeve Inc. demonstrated at Comdex last week Hyper Access/5, a data communications package, that takes advantage of a spectrum of OS/2-specific features.

The \$199 product, which is scheduled for June shipment, will also come in a DOS version, according to Hilgraeve president Mark Gray.

Hyper Access/5 not only supports multiple communications sessions and background operation, which can be performed on DOS windowing

products, but can also spawn child processes and run detached operations, which are OS/2-specific features, Gray said.

Child processes are concurrent tasks set in motion by an application. The product's command language and macro learning capabilities combined with child process spawning will allow users to perform complex data retrieval and analysis functions by passing captured data to other programs, Gray said.

Detached operations execute under OS/2 without keyboard or screen involvement. Gray said Hyper Access/5's use of the feature will help users perform routine data-transfer tasks that

don't require user intervention once set in motion. This could include a large upload of data to a minicomputer database in which the user wouldn't need to observe the stream of data, freeing up the front screen group for other operations.

Hyper Access/5 includes macros, commands, and scripts. Commands can be written dynamically by capturing user operation, Gray said.

Security, individualized access permissions, and password management features are standard in the product, according to Gray. He also claimed workstations using the product for direct file transfer can take advantage of its inherent data-compression capability to achieve 5,000-bps-equivalent transmission rates.

Hilgraeve Inc., Genesis Centre, 111 Conant Ave., Monroe, MI 48161; (800) 826-2760.

Assante Ethernet Adapter for Mac SE/30 Runs on Twisted Pair

BY LAURIE FLYNN

CHICAGO — Assante Technologies Inc. formally announced last week an Ethernet adapter card for the Macintosh SE/30 that is capable of running on twisted-pair wiring.

In a standard configuration, the Mac SE/30E, which was announced at spring Comdex here, allows users to attach systems to thin Ethernet wiring. Support for twisted-pair wiring is available as an option.

The product is compatible with Intel's new twisted-pair Ethernet networking model, which will eventually mean improved performance, the company said.

The Mac SE/30E supports distances of up to 305 meters over thin Ethernet and attachment of up to 100 devices, the company said.

The Mac SE/30E card will be available in June for \$595.

The company also announced a \$395 Ethernet card for the Macintosh SE. The card, called the Mac SE/E, is intended for the education market and will be available next month. The product runs only on thin Ethernet wiring, Assante said.

Assante Technologies Inc., 1050 E. Duane Ave., Suite G, Sunnyvale, CA 94086; (408) 736-3360.

NCR Single-Chip Ethernet Controller Supports 16-, 32-Bit Data Transfers

As servers become faster and create a networking bottleneck at the adapter card, users may be heartened to know that NCR Microelectronics of Colorado Springs, Colorado, will soon ship a single-chip Ethernet controller supporting both 16-bit and 32-bit data transfers.

NCR's 922C8 is compatible with both AT and Micro Channel bus controllers, operating as either a bus master or slave, the company said. The chip supports a 128K buffer in 16-bit mode and a 256K buffer in 32-bit mode.

These larger buffer sizes, combined with automatically

managed receive and transmit buffers, significantly reduce overhead and improve total performance, according to NCR.

The chip supports both programmed I/O and memory-mapped bus transfers. It supports the IEEE 802.3 layer management standards, taking the burden of collecting many network statistics from the host processor, NCR said.

The 92C28 will ship in June, and users can expect to see network adapter card designs based on the chip by fall, according to the company.

— Mark Stephens

Triton's Co/Session 4.0 Includes Updated User Interface

BY JEFF ANJOS

CHICAGO — Upgrading the user interface on its remote-control software, Triton Technologies Inc. introduced at Comdex an update of Co/Session that offers pop-up menus and the capability for users to use either single alpha keys, function keys, or menu picks.

Called Triton 4.0, the Co/Session product will also be bundled as part of Brightwork Development's Netremote Plus,

the company said.

In addition, Version 4.0 will add support for EGA, Hercules, and VGA screens, host or remote, said Triton's director of marketing James Mulholland.

The program will operate 25 percent faster than previous versions, using an error-correcting protocol similar to that used in SDLC or X.25 standards. Mulholland said. He stressed the largest gains to users would stem from the redesigned interface, which was built to make the

product easier to use.

Co/Session 4.0 should ship in early May at a retail price of \$249.

The \$350 server Netremote Plus 3.0 works on Novell Netware running IPX. A \$695 license for four servers works with operating systems including Banyan, 3Com, Netbios compatibles, and Novell. Triton Technologies Inc., 200 Middlefield, Essex Turnpike, Iselin, NJ 08830; (201) 855-9440.

Allied's Ethernet Concentrator Can Mix Cabling Types

BY MARK STEPHENS

Network administrators who find themselves faced with connecting thick Ethernet, thin Ethernet, twisted-pair subnets, and perhaps a fiber-optic backbone may be interested in a multimedia concentrator from Allied Telesis, Inc. that allows users to mix and match Ethernet segments running on all types of network plumbing.

Allied's Centremcom 5000 is a rack-mounted unit that accepts up to 10 plug-in modules, said company chairman Takayoshi Oshima. Automatic partitioning takes place whenever a faulty segment is detected, with automatic reconnection when the fault is corrected.

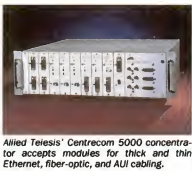
The concentrators can be cascaded to increase the number of users on the net or linked to

local bridges or repeaters.

The Centremcom 5000 is shipping this month, with the basic chassis and power supply priced at \$1,295 and individual modules starting at \$249, Allied said.

Allied will also ship this month its first Ethernet adapter card, Oshima said. The Centremcom PC/SIC is a \$395 16-bit adapter featuring 32K of dual-ported RAM. Jumpers on the card allow users to match the card to the PC's clock at rates of up to 20 MHz.

The card is specially designed to support a TCP/IP package developed by Allied and FTP Software Inc. The package supports file transfer, electronic mail, remote login, routing, and subnetting.



Allied Telesis' Centremcom 5000 concentrator accepts modules for thick and thin Ethernet, fiber-optic, and AUI cabling.

The PC/SIC will fit in many laptop computers and this is where Allied will be devoting much of its future adapter development, according to Oshima. "We'll shrink this card even further with surface-mount technology, mounting parts on both sides of the board," Oshima said. "The lack of laptop standards enforcement, with each machine following a slightly different bus standard, presents an ideal market opportunity for us."

Allied Telesis Inc., 627 N. Atlantic Mountain View, CA 94043; (415) 964-2771.

NSF-Net to Expand to Other Institutions

BY SCOTT MACE

WASHINGTON — The coordinators of NSF-Net, a data backbone connecting six supercomputing centers and seven university-based research networks, will start plans this month to open to other institutions next month.

The additional sites will be added after October 1, according

to Eric Aupperle, president of the Merit Computer Network, in Ann Arbor, Michigan, which manages NSF-Net for the National Science Foundation (NSF).

Merit is also working with IBM and MCI, which helped build NSF-Net, to increase sections of the NSF-Net TCP/IP backbone from T1 (1.5-mbps) to T3 (44.7-mbps) speeds in

1990 using existing NSF funds, Aupperle said. OSI protocols will be added starting in 1990, said Doug Van Houweling, vice provost of information technology at the University of Michigan in Ann Arbor.

The extra speed is essential, according to Murray A. Thompson, director of the physical sciences laboratory at the University of Wisconsin at Madison. Even a modest high-energy physics experiment can easily produce 1,000 100-megabyte magnetic tapes, Thompson said. Researchers can presently move only about 20 gigabytes of data at a time by driving a tape-filled station wagon from facility to facility, he said.

Despite its limitations, NSF-Net is experiencing a boom in use. "Demand is growing rapidly, and we cannot tolerate a period of poor service through an overloaded network," Van Houweling said. With backbone traffic doubling every 4½ months, network saturation could come in 1½ years, said William Wolfe, assistant director of the NSF.

Several federal interagency task forces are trying to pool existing funds for national competitive reasons. "A federal investment of less than \$100 million per year will yield billions of dollars worth of additional productivity from the nation's research and development," Van Houweling said.

GE Lowers Genie Daytime Rate; Compuserve Adds Minimum Fee

BY SCOTT MACE

ROCKVILLE, MD — Following Compuserve's recent decision to start levying a monthly membership fee, GE Information Services recently announced that daytime rates for the Genie on-line service will drop to \$18 per hour beginning May 1.

Between 8 a.m. and 6 p.m. local time, Monday through Friday, the current Genie rate for 300- and 1,200-bps service is \$35 per hour, and current 2,400-bps access costs \$42.50 per hour.

On May 1, rates for 2,400-bps service during all other hours and during national holidays, known as non-prime-time service, also will drop to \$10 per hour from \$12.50 per hour, Genie officials said.

The non-prime-time rate for 1,200-bps service will increase from \$5 per hour to \$6 per hour, and the non-prime rate for 300-bps access will remain \$5 per hour.

"Our rapid growth since

1985 has allowed us to make these significant reductions" in rates, said Genie general manager Bill Loudon.

Columbus, Ohio-based rival Compuserve began charging a \$1.50 monthly membership support fee on April 2. Its hourly connect charges did not change.

Between 8 a.m. and 6 p.m. local time, Monday through Friday, the current Genie rate for 300- and 1,200-bps service is \$35 per hour, and current 2,400-bps access costs \$42.50 per hour. On May 1, rates for 2,400-bps service during all other hours and during national holidays, known as non-prime-time service, also will drop to \$10 per hour from \$12.50 per hour, Genie officials said.

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"Our rapid growth since

Comdex Product Intros Offer Peripheral Interest

BY PATRICK DRYDEN

CHICAGO — Innovations from clever switches for sharing peripherals to new backup solutions for safeguarding LAN data were tucked away in Comdex booths here last week.

MDS Marketing of La Mirada, California, offered two new switch boxes that help business sites move data off-site for protection while maintaining communication devices sort out incoming calls. Both devices transparently and automatically route voice and modem calls to the appropriate connections — even at extensions in a multistation office — to save users the cost of installing extra dial-up lines, said company spokesman Sid Bhatt.

The three-mode Phasix Switch passes incoming fax messages directly to a stand-alone or PC-based fax and rings the user's phone for voice calls and incoming dial-up fax transmissions. The \$199 Phasix Switch can also pass all calls to a fax or answering machine in unattended mode.

The Eliminator TFS00 adds Telex and data-mode recognition to voice options similar to those in a voice messaging system. Manual callers select target communications devices by keying codes described in an announcement menu. It costs \$399.

Pal Group Inc. of Torrance, California, showed a palm-size box that links two PCs to one parallel printer or one PC to two printers. The \$99 Bothways automatic switch, scheduled to ship in May, sends out whichever PC first locks a print stream or accepts a printer selection command from the PC.

Digital Products Inc. of Watertown, Massachusetts, showed two Netcommander serial devices that simplify printer sharing and file backups in LAN-less workgroups.

The Netcommander 10G allows PCs to share a mainframe laser printer. Its built-in protocol converter translates data to an HP-compatible laser printer that handles PC's serial data via serial connections. The intelligent switch box is now available for \$2,495.

The Model DC-2 Sublan Backup expands the Netcommander to allow data backup from a standard PC to a single external tape drive. The serial backup system, available for \$3,495, is designed for automatic, unattended overnight backup.

Emerald Systems Corp. of San Diego expanded its LAN data backup lineup with a diskette-based starter system and optional indexing software for its tape backup systems.

New Embackup offers economical floppy disk backup and restore as an introduction to its

more powerful tape backup systems, said company spokesman Lisa Angeles. Emerald directs this package at users of Netware 3.11 and 3.12, and a 386 server under 40 megabytes. Embackup works under Windows for simple selection of local and network volumes, directories, and files by mouse or by keyboard. The \$195 package, shipping April 28, supports both 5¼- and 5¼-inch formats at any PC, PS/2, or compatible system connected to a Netware server.

Emerald extended new data recovery capabilities to users of its Tape Backup Server with EmLib. This library option

COMDEX NEWS

maintains an index of all backup activity so that Emerald users can select among available versions of a file or directory to be restored to a server or local disk drive. EmLib entails which tape contents are stored in directories to eliminate tedious searches through archives for a large LAN installation. The software requires one or more Vast drives, works under Windows, and ships May 8 for \$395.

The Panasonic Office Automation Group of Secaucus, New Jersey, demonstrated an optical disk jukebox providing 47 gigabytes of WORM storage for LAN backup/archiving or other applications. The new LF-15000 contains two Panasonic 5¼-inch WORM drives with capacity for 50 removable, double-sided cartridges plus robotics to swap and flip the cartridges. The SCSI-based system, scheduled for June shipment, will support Novell and 3Com environments through software coming from Corel Systems Corp., according to Panasonic spokesman Ron Tomczyk.

Corel's optical division, in Ottawa, Ontario, will provide new software and driver software for Netware, Version 2.15 and 3Com 3+ environments, according to Corel spokesman Arlen Bartsch.

Advanced Digital Information Corp. of Redmond, Washington, showed a new software system for backup and restore on Novell Network networks. Each drive offers a magazine of 10 DC 2000 tape cartridges that users can access sequentially for backup of large file servers and individually separate critical directories. A marketing manager Bob Reed, LANbackers now shipping include the 40-megabyte Model 4000 for \$5,995 and the 80-megabyte Model 8000 for \$7,995, Reed said.

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You can use the Impulse drive system in Novell™, 3Com®, and IBM® PC LAN programs. And it's compatible with most 286/386™ systems.

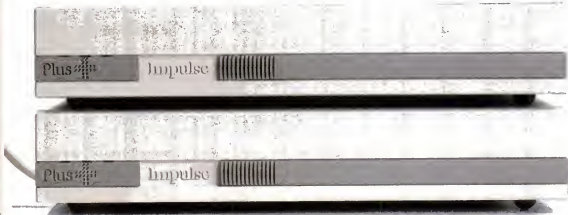
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The Impulse system features a 12 millisecond effective access time,* an embedded controller with 64 KB of on-board cache and a maximum transfer rate of 4 megabytes per second. Which means an Impulse 40 or 80 MB drive delivers 300 MB drive performance.

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We'll tell you everything you need to know about Impulse. Then, we'll send you our free book entitled "A Guide For Specifying Mass Storage Capacity For PC LAN Servers." It's Plus' definitive guide to determining storage capacity for PC LAN servers. And a valuable reference for anyone who has questions about the future of their PC LAN network storage plans. Contact us today.

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Send me your free book by Plus called "A Guide For Specifying Mass Storage Capacity for PC LAN Servers."

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Phone _____

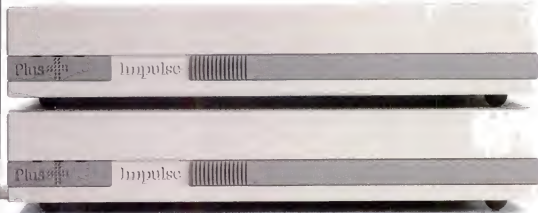
I am a _____ reseller _____ end user (select one).

Plus Development Corp.
1778 McCarthy Boulevard, Milpitas, CA 95035

203

*With benefit of Impulse's DirectCache architecture. Assumes 50% hits. Impulse is a trademark of Plus Development Corporation. Novell is a trademark of Novell, Inc. Xeon is a registered trademark of Xeon Corp. IBM is a registered trademark of International Business Machines Corporation. 386 is a trademark of Intel Corporation. ©1989 Plus Development Corp.

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OS/2 NEWS

A continuing report on advanced software for personal computers.

Get a free IBM OS/2-based version of Sidekick for Presentation Manager.

When you order IBM OS/2™, you'll receive Borland's Sidekick® free (while supplies last). Sidekick for Presentation Manager™ includes an easy-to-use planner, phonebook, calculator and notepad using the graphical interface. It gets you off and running with IBM OS/2 today.

Improved word processing software based on OS/2 is introduced by WordPerfect.

WordPerfect® has announced that a version of its best-selling word processor is now available for OS/2. The OS/2 version offers all the features of their popular MS/DOS® version while taking advantage of OS/2's capabilities, including multitasking. For additional information please call 1 801 225-5000.

Accountants get true multitasking via ACCPAC Plus and OS/2.

ACCPAC® Plus System Manager/2 is an accounting software package from Computer Associates International. It allows simultaneous execution of multiple accounting functions by using the protected mode of OS/2. This enables users to enter sales orders while concurrently performing payroll calculations and printing financial statements. In addition, thanks to the Virtual Memory Feature of OS/2, users can toggle between a number of applications without having to exit one program and load another. For additional information please call 1 800 531-5236.

Create exciting three-dimensional, dynamically developed maps using OS/2.

Mapmaking is easier than ever with MapViewer from Golden Software Inc. MapViewer uses OS/2 and Presentation Manager window screens to display two- and three-dimensional thematic maps. These maps can show



population density or physical contours, and include shading. For additional information please call 1 303 279-1021.

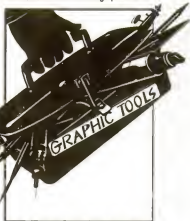
Retailer begins use of OS/2 to monitor remote retail sales.

Host International has begun to use OS/2 to give computing capabilities to their individual concessions and to network shops with regional offices for daily downloading of sales and employee data. The internally developed system also provides for remote data entry, collection and reporting.

Developing graphics for OS/2 applications is made easy with Toolkit from Graphic Software Systems.

High-performance graphics on microcomputers are made possible with OS/2 Graphics Development Toolkit from Graphic Software Systems. This package supports all OS/2 features while maintaining source code compatibility with the OS/2 Graphics Development Toolkit. It allows dynamic loading plus workstation

control. Functions for lines, arcs, polygons, circles, bars and advanced graphics are all



part of the package. For additional information please call 1 503 644-6766.

Micrografx announces an easy way to port Windows applications to OS/2 Presentation Manager.

Micrografx® has introduced Micrografx Mirros. This software development tool makes it easy to port any Microsoft Windows® application to the OS/2 Presentation Manager. It's currently being used successfully to port Micrografx Designer, Graph Plus, Draw Plus and Clip Art to OS/2. For additional information please call 1 800 272-7329.

Free OS/2 Application Guide available.

You can receive a 700-page OS/2 Application Guide that lists and describes over 800 identified applications for the OS/2 operating system. For a free copy of this guide call 1 800 IBM-2468, ext. 120.



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SOFTWARE

PC/Focus 4.1 to Split Procedures

Cooperative Processing Version to Run on Servers, Workstations

BY SCOTT MACE

Information Builders expects to ship this year a cooperative processing version of PC/Focus that will let developers split Focus procedures, running parts on both servers and workstations.

The new version, Release 4.1, puts the burden on the application developer to choose where to divide the Focus procedures, said David Feldstein, Information Builders' vice president.

PC/Focus, Release 4.1 is due to ship in the late third or early fourth quarter. It will follow the scheduled second-quarter deliv-

ery of Release 4.0, which will support SQL syntax and two SQL database servers.

4.0 ENHANCEMENTS. Window Painter is also enhanced in Release 4.0, so developers can create without programming complete character-based applications with pull-down and pop-up menus, various window types, and full character-attribute control.

"We first came out with Window Painter as part of PC/Focus in 1987, and it was so well-received that it's become part of every mini and main-frame Focus system as well," Feldstein said. With Release 4.0,

users can create executable applications from the Window Painter environment, with all application control logic within the single file.

Using the ANSI-standard SQL in Release 4.0, users can append elements of the Focus reporting language to SQL requests querying various DBMS servers. Users can also query PC/Focus databases on a single-user system.

A Report Painter added in Release 4.0 lets users create free-form reports such as invoices, forms, and letters. Users can type text anywhere on the page and use a pop-up menu to place fields from any Focus database.

The new Import/Export utility in Release 4.0 lets PC/Focus automatically create a Focus database file out of any database file or Lotus spreadsheet. The export utility now also adds support for Dbase, WKS, and Symphony file export, and the PC/Focus async and coax communications facilities now fully support the Kermit protocol. Version 4.0 takes up 30K to 50K less RAM than previous versions and increases the num-



PC/Focus 4.0's Report Painter lets users create free-form reports with an on-screen editor and place them with a pop-up menu.

PC Presentation Package Offers Integrated Outliner

Uses LCD, Video Technologies for Displays

BY BOB PONTING

Symsoft Corp. is scheduled to release this month a presentation graphics program with features that exploit real-time computer graphics on LCD and video projection systems, and it is apparently the first such PC product with an integrated outliner.

The new product, called Hotshot Presents, lets users arrange a presentation by connecting slides with a variety of special effects transitions, said Michael Cuthbertson, Symsoft's president. It also prints speaker notes, slide handouts, and overhead transparencies.

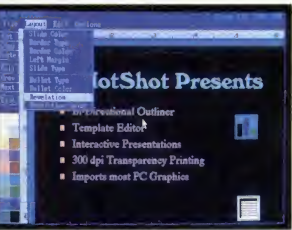
Users can create custom slide templates, specifying border style and background, text, and bullet colors from a palette of 16 possible hues, Cuthbertson said. Slides can include large graphics

in a much smaller viewing window that can be panned and zoomed during the presentation. Charts, drawings, and spreadsheets can also be placed on slides as icons that display only when selected.

The program supports 11 slide transitions, which can be preset or controlled manually.

Hotshot Presents runs on PC and PS/2 compatibles with 640K of RAM and a hard disk: DOS 2.1 or later, and a CGA, EGA, VGA, or Hercules-compatible graphics card. The program supports most laser printers, Epson compatibles, the HP Paintjet, and the Polaroid Palette film recorder. It costs \$349, and graphics filters for Autodesk, CGM, or HPGL files cost \$150 each.

Symsoft Corp., 444 First St., Los Altos, CA 94022; (415) 941-1522.



Hotshot Presents lets users store full-screen graphics as icons that are activated with a mouse or other pointing device.

MARKET TRENDS

Corporate Use of Shareware Increases

High Quality and Low Prices More Than Compensate for Virus Fears

BY BOB PONTING

While publicity about computer viruses has led some users to swear off software unless it comes in a shrink-wrapped package, many corporations continue to use shareware because it often offers quality products at bargain prices.

"What I would call the hysterical reaction to the V-word has harmed shareware in some corporations," said Barry Simon, president of the Association of Shareware Professionals, a shareware developers organization. "It's ironic, because I haven't heard of one case of a virus associated with a shareware program."

Many shareware vendors continue to prosper despite the stigma. Among the companies that have posted more than \$1 million in sales last year are Datatrust Technologies Inc. of Columbia, Missouri, which sells the Procomm communications program; Quicksoft of Seattle, which sells the PC-Write word processor; Buttonware Inc. of Bellevue, Washington, which sells the PC-File database; and MacGe Enterprises of Norcross, Georgia, which sells the Auto-menu DOS shell.

"I don't know if any shareware author who has seen the virus scare hurt sales," said Jim Button, president of Buttonware. Many users are more cautious now about downloading files from bulletin boards, but most large companies avoid questions about a program's pedigree altogether by dealing directly with shareware vendors through site licenses and volume purchase agreements, he said.

"I would say that corporate purchasing of shareware is, if anything, increasing," Button added. In addition, the concept is no longer new, which may keep corporations from being wary.

Other developers report continued success selling to such corporate giants as Boeing, AT&T, GE, TRW, and IBM. "Pricing has been our biggest selling point," said Neil Berry, Quicksoft's sales manager. "In the past six months, we've added about 40 companies to group licensing."

IRRESISTIBLE. But shareware sometimes succeeds even when it enters through the back door. AT&T RJR Nabisco Inc. in Atlanta, several user/hobbyists brought in Procomm even though the PC support group was pushing two retail communications packages. "We found it to be the simplest product on the market to teach a novice," said Dave Little, manager of information systems auditing. Although the support group resisted, "we got enough people using it to reach a critical mass," Little said. The company now licenses more than 100 copies of Procomm.

Shareware is especially attractive when a program must be distributed in volume. The *Los Angeles Times*, which wanted to distribute a PC editor to all reporters, chose PC-Write as its word processor because it met all functional requirements at a price that retail programs can't match, said Wayne Barrack, deputy systems editor.

Times management was skeptical of shareware at first. "I think there were some raised eyebrows, but the price was so good," Barrack said. Also, Quicksoft provided PC-Write source code, so Barrack could modify it to work like the *See Shareware*, Page 23

Before You Start Your File On Our LAN Communications Products, Consider The Driving Force Behind Them.



Once upon a time, there was a car that made the complex job of transporting people look remarkably simple. When we got into LAN Communications at DCA[®], we started simply too. But as the job of transporting information became more complex, we made some very sophisticated additions to our product line. Today we have a wide range of LAN Communications products, like our IRLAN[®], DCA Select, and IONET[®] local area networks, but we never forget the driving philosophy behind them. Like the Beetle, they get you where you want to go. And that's reason enough to start a file on DCA today. **DCA**

A White Paper by DCA

The Merging of PC LANs and 3270 Networks

A Prospect

PC WEEK

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LAN Acquisitions Shift To Corporate MIS Level

By GEORGE BRIGGS

BOSTON—Two new trends emerging in the personal-computer local area network marketplace — a shift in who is buying the equipment, and a subsequent refocusing of vendor selling strategy — together will change the nature of the LAN market permanently.

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IRMALAN Products Establish DCA as Leader in LAN Mainframe Gateways

By David Strom

Digital Communications Associates' (DCA's) new IrmalAN 3725 Gateway, IrmalAN SNA Workstation version 2 and APA Workstation version 2 products are a big step for the Alpharetta, Ga., communications firm. With these new products, DCA has the strongest local area network (LAN) mainframe-gateway product line of any vendor, including IBM.

The new IrmalAN...

PC MAGAZINE • OCTOBER 11, 1988

DCA Fulfills 10NET's Charter With Several LAN Products

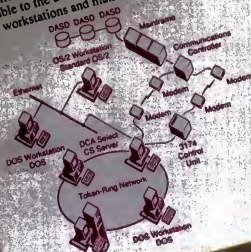
By TONY ROBINSON

NEW YORK—10NET Communications, after be-

10NET Plus: Everything PC LAN Do Plus E-mail and Group Sch

PC HANDS ON

The following graphic depicts the many options available to the user with DCA Select CS for LAN workstations and mainframe connectivity.



Please send me additional information on DCA's LAN Communications Products:

- ☐ DCA IrmalAN Gateways
- ☐ DCA IrmalAN Workstation Products
- ☐ DCA 10NET Local Area Networks
- ☐ DCA 10NET LAN Products
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Customer Representative
Marketing Information Group

DCA

1000 Alderman Drive
Alpharetta, GA 30201-4199
1-800-241-4762, Ext. 51
In Georgia 404-442-4500, Ext. 51

Mace Vaccine Upgrade Seeks, Spots Viruses

By Jeff Angus

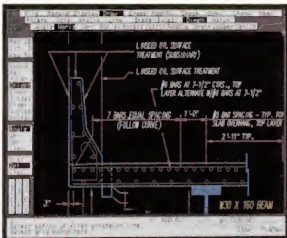
Paul Mace Software updated this month its Mace Vaccine program to seek and spot viruses as well as provide disk "prophylaxis."

Also released was an unbundled version of Mace Backup 2.0, a high-speed backup and restore utility with many functions not in the DOS Backup command.

Mace Vaccine protects hard and floppy disks from inadvertent or malicious reformatting, as well as guarding against viruses, author Paul Mace said. It prevents alteration of boot sectors and system areas, and to detect viruses it checks all programs for alteration before allowing them to execute. The \$99 program uses 6K of RAM.

Mace also released Mace Backup, a utility previously sold as part of the Mace Gold utilities. The package, available alone for \$99, supports multiple tapes to back up and restore files by letting the user select or exclude files based on directory, date, extension, or attributes. It also includes a report function for auditing. Mace also said the product recovers files from damaged disks and is able to redivide files for reorganizing disk hard partitions. Mace Backup comes with POP, a power-out protector that saves the contents of memory to disk on command or at a specified interval.

Paul Mace Software, 400 Williamson Way, Ashland, OR 97520; (503) 488-2322.



Foresight Resources' Drafix add-on uses DOS-extender technology to accommodate larger files under Drafix CAD Ultra.

Foresight's Add-On for Drafix CAD Package Allows for Larger Drawings

By Bob Ponting

Foresight Resources Corp. is offering an add-on for its Drafix CAD Ultra package that allows it to handle larger drawings by using extended memory.

The upgrade, Drafix CAD Ultra/386, uses DOS-extender technology from AI Architects to overcome the 640K of DOS RAM limit. It only works with the \$395 Drafix CAD Ultra.

The Drafix Ultra package can access all available extended memory on both 80286- and 80386-based systems, users of AT-class machines will notice a speed reduction when using the DOS extender because of the overhead when running in protected mode. It requires 640K of RAM and at least 1 megabyte of

extended memory.

The program costs \$195 and includes Foresight's Otto utility to convert files between Drafix Autocad DXF formats.

Foresight also released new versions of its three Professional Symbol Libraries for use with Drafix CAD. All are enhanced with descriptive attribute information that is accessed by Foresight's data-analysis and reporting program Cadapult to prepare bills of material, estimates, and invoices.

New libraries of architectural, electrical, and mechanical symbols are available for \$150 each.

Foresight Resources Corp., 15311 N.E. 90th St., Redmond, WA 98052; (206) 883-0074.

Logan Adds 3 System Utilities To Concurrent DOS Tool Series

By Bob Ponting

Logan Industries recently added three new system utilities to its family of tools for DRI's Concurrent DOS multiuser and multitasking operating system.

The programs are Symson, which monitors system performance; Logout, which offers password security and user tracking; and Pfile, which saves printed files to disk.

The \$99 Symson lets application developers and system administrators monitor real-time system performance, according to the developer. It helps determine CPU efficiency, memory allocation, and other system resources in use. Developers can use it to help optimize their applications, while system administrators can use the information to fine-tune overall system performance, said Garry Silvey, product manager at Logan Industries.

Silvey estimated about 100 developers and up to 1,000 dealers and VARs now use

Concurrent DOS. The system is often used by small businesses or departments as a cost-effective alternative to DOS network systems and Xenix, he said. It tends to be used with vertical, multi-user applications like point-of-sale systems and distributed databases.

Another Logan utility, Logout, controls user access to the Concurrent DOS system and lets the system manager assign subdirectory access and printer usage to individual user accounts. The \$179 program can also be used to create trustee accounts that have access only to a single menu or application, according to the company. Logout also generates system use statistics for display as single events or bar graphs or that can be exported to external databases for accounting.

Pfile, which costs \$49, saves printer files as disk files.

Logan Industries Inc., 604 Mango Drive, Melbourne Beach, FL 32951; (407) 984-1627.

3-2-1 Gosub Developer Edition Adds @ Functions to 1-2-3 as True Add-Ins

Frontline Systems released last month an application programmer's toolkit for Lotus 1-2-3.

The \$249.95 package, called 3-2-1 Gosub Developer Edition, provides tools to add new @ functions to 1-2-3 as true add-ins for distribution to users.

It contains all the features of 3-2-1 Gosub and a compiler that

turns @ functions and subroutines into true add-ins.

3-2-1 Gosub also can upgrade for \$150, plus \$20 shipping, from the developer.

Frontline Systems Inc., 140 University Ave., No. 100, Palo Alto, CA 94301; (800) 451-0303, ext. 55.

— Peggy Watt

NEWS BRIEFS

CAM EXPERT SYSTEM TOOL USES MULTIPATH TREES

CHICAGO — Logic Tree, a low-cost expert system tool that uses multipath decision trees to build applications equivalent to more than 100,000 rules, was unveiled here at Comdex and is scheduled to ship in June from CAM Software Inc.

The package uses decision-tree logic instead of strictly rule-based programming and supports multiple paths rather than exclusive path, processing, the company said. Because it uses decision trees, Logic Tree does not need to search at each decision point for relevant rules. They are instead contained in the context of its location on the tree.

The package can process multiple branches on the tree simultaneously, allowing up to 65,536 possible options at each decision point. Multipath processing also lets the user follow other branches if one ends.

Logic Tree lets users create expert systems without pro-

gramming by prompting them to enter information at each point in the tree, and graphically displaying the results.

The package is most suitable to build expert systems involving diagnostics, classification, complex decision making, and documentation of logic or software, according to CAM.

Logic Tree costs \$495 and runs on PC compatibles with 640K of RAM, DOS 2.0 or later, and a hard drive. It supports a two- or three-button mouse.

CAM Software Inc., 750 N. 200 W., Suite 208 Frovo, UT 84601; (801) 373-0800.

BEDFORD SHIPS TOOLBOX

Bedford Software Corp. is shipping a toolbox that lets users create graphs and financial reports using data from the company's accounting software.

Bedford also expects to bundle a forecasting template for 1-2-3 with its Bedford Accounting package by late spring.

The Bedford Toolbox includes Report, a report writer that adds detail and flexibility to

the accounting package's reporting features, and Graph, which can graph both data and financial statements.

The \$129 package requires 384K of RAM, DOS 2.0 or later, and Bedford Accounting, Version 3.0 or later.

Bedford Software Corp., 15311 N.E. 90th St., Redmond, WA 98052; (206) 883-0074.

GOOD SOFTWARE UNVEILS FLEXIBLE DOS-BASED PIM

Good Software Corp. unveiled a flexible personal information manager (PIM) for DOS portable and desktop systems that adapts to a user's quirks or the demands of a vertical market.

The product, called Arriba, accepts free-form text or data entered through structured forms, such as the templates included for contacts, expenses, real estate transactions, and other tasks.

Arriba is intended as a broad-based PIM that can be tailored easily to many applications, according to company representatives. Its easily customized folders-and-notes approach lets users enter and track information in any way, said Jim Smith,

COMDEX NEWS

Good Software president. Users can also search topics, subjects, and associated notes quickly.

The program uses Boolean search routines for text, moving items among folders, and moving Arriba data. Its built-in applications include contact forms, phone lists, appointment scheduler and calendar, reminder lists, and expense forms.

Arriba, which costs \$195, requires a PC compatible with 384K of RAM, DOS 2.0 or later, and a hard disk.

Good Software Corp., 13601 Preston Road, Suite 500W, Dallas, TX 75240; (214) 239-6085.

ZYLAB RELEASES AUTOMATIC RETRIEVAL FOR ZYINDEX

A program that automates retrieval of Zyindex search results was announced and released last week by ZyLab Corp.

Zyreport "completely automates retrieval of needed search results," said Thomas Priestley,

ZyLab's president. "A user can enter a search request, tell Zyreport how much text surrounding each hit to retrieve, and direct it to the screen, a printer, or a text file. It will also provide page and line number to pinpoint text origin."

By using batch files, users can set up searches and walk away from the computer, just as they do now for indexing, Priestley said.

Zyreport is being bundled with Zyindex Plus, which costs \$695, and Zyindex Server, which costs \$2,595. Registered users who acquired those products within the past 90 days can get a free copy of Zyreport directly from ZyLab. Copies are available directly from the developer to other current users for small fees.

ZyLab also demonstrated versions of Zyindex for Macintosh and Xenix System V that were announced last fall. Both are scheduled for release in the third quarter.

ZyLab Corp., 3105-T N. Wilke Road, Arlington Heights, IL 60004; (312) 632-1100.

— Compiled by Stuart J. Johnson, Scott Mace, and Patrick Dryden.

Lifetree Ships First of Stand-Alone DOS Grammar Checkers

BY BOB PONTING

Launching a new line of stand-alone DOS grammar checkers, Lifetree Software Inc. began shipping last week a stand-alone program that uses artificial intelligence parsing techniques to analyze entire sentences for punctuation, style, spelling, and syntax errors.

The program, which is called Correct

Grammar, is the first program in a series of products that Lifetree is planning and that are based on the Houghton Mifflin Correcttext Grammar Correction System, which is widely bundled with other products.

The program, which is designed to work with Word Perfect 4.2 and Word Perfect 5.0 and has a similar interface, can check a document for style and spelling without affecting Word Perfect format commands and allows access to Word Perfect's user-defined spelling dic-

tionary, Lifetree Software said.

Users can invoke Correct Grammar from within Word Perfect, the company said. It can run interactively, stopping to suggest changes, or can check an entire document and leave comments in Word Perfect format for easy editing. When interactive mode is in use, users can correct, edit, comment, or ignore possible errors.

Correct Grammar also offers several levels of rules of grammar and full-screen tutorials, according to the company. The

product's knowledge database contains more than 135,000 words, representing 99 percent of those words used by most writers.

Correct Grammar costs \$99 and runs on PC or PS/2 compatibles with 440K of RAM and a hard disk. Lifetree also uses the Correcttext grammar system in its Volkswriter 4.0 word processor and plans to release versions for other popular word processors.

Lifetree Software Inc., 411 Pacific St., Monterey, CA 93940; (408) 373-4718.

DTG System Sleuth Adds Support for PM, Microsoft Windows

BY MARK BROWNSTEIN

A new version of System Sleuth that adds hard disk preventive maintenance and memory tests to the diagnosis program and also supports both Microsoft Windows and Presentation Manager is being developed for third quarter delivery, according to publisher DTG Inc.

The new product, called Sleuth Advanced, will use the dynamic link libraries and the dynamic data exchange (DDE) protocols of Windows and Presentation Manager. The update will include a hard disk preventive maintenance routine that monitors performance and warns users when a disk degrades to the point of needing maintenance. Sleuth Advanced will also map hardware interrupts in use to help determine which interrupts are available for add-in boards.

A new memory test feature will examine all system memory in use and can note degradation of individual memory chips before their failure. The program can also monitor LIM 4.0 memory.

Sleuth Advanced also contains an analysis engine that suggests solutions to the problems it finds, DTG said. It can incorporate option libraries, including remote libraries that will allow specific enhancements to Sleuth Advanced's functionality, as well as support for remote diagnosis over a network.

Sleuth Advanced will cost \$295, an increase over the \$149 System Sleuth now shipping. Users who acquire and register System Sleuth before April 30 will be able to upgrade for a \$25 handling fee.

DTG Inc., 23704-5 El Toro Road, Suite 348, El Toro, CA 92630; (213) 987-2000.

Shareware

Continued From Page 19

paper's in-house publishing system. Times reporters also use a communications program called LA-Talk, a custom version of the shareware product PC-Talk from Headlands Press, in Tiburon, California.

Shareware continues to win new corporate customers because it offers three key advantages over retail products, said the shareware association's Simon. Users can try before they buy, prices are invariably lower, and support is often superior to that of commercial products.

"There is also a tendency for shareware authors to be at the leading edge," Simon said. "I have no doubt that, as OS/2 catches on, there will be lots of shareware utilities, just as there are lots of DOS shareware utilities." □

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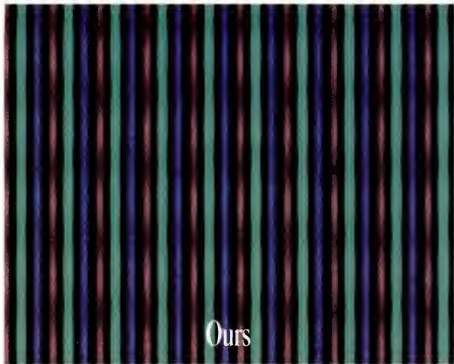
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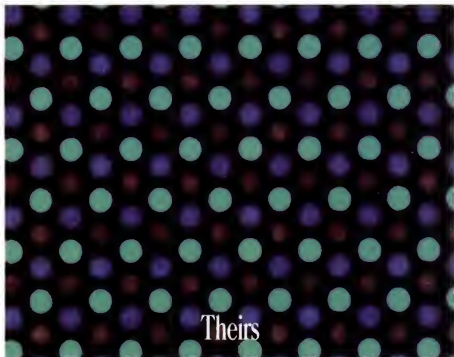
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HARDWARE

Speedkit Controller Card Doubles Hard Disk Speed

BY JEFF ANJOS

Speedkit, Western Digital Corp.'s disk controller card introduced at Comdex last week, will double hard disk performance, the company said.

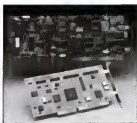
The retail product, scheduled to ship later this month, is targeted for owners of MFM drives in AT-class machines who want to achieve faster disk speeds, according to the company.

The controller operates at a 1:1 interleave with a 13-sector buffer, said Alexis Colicchio,

Western Digital's director of marketing for storage products.

Most important, the controller uses a look-ahead cache system that, Colicchio said, "doubles the data-transfer rates users have gotten from standard AT systems." The cache interprets current data operations and "guesses" the next data to be called based on past calls, she said.

The \$225 aftermarket controller is the first retail controller to be sold by the company that has traditionally only supplied controllers to OEMs. Speedkit



Western Digital's Speedkit disk controller offers 1:1 interleave and look-ahead cache.

supports ST506, SCSI, and ESDI interfaces and supports two MFM drives and two floppy drives in both 5¼- and 3½-inch form factors.

Western Digital Corp., 2445 McCabe Way, Irvine, CA 92714; (714) 863-0102.

Trillian Unveils Line Of Dual-Cache 386s

BY PATRICIA J. PANE

Trillian Computer Corp. is unveiling today a line of 20-MHz and 25-MHz 80386-based systems featuring a dual-cache architecture with disk controller, which the company says will deliver an average disk access time of 0.5 milliseconds and a throughput time of 4 mbytes per second.

Called the Dualcache 386/25 and Dualcache 386/20, the systems' four-way memory cache ensures zero-wait-state operation, while a second cache in the disk controller guarantees a data transfer rate of 4 megabytes per second, the company said.

"We have a very, very efficient four-way cache for the memory on the system board," said Bill Sautter, vice president of marketing. "In conjunction with the caching right on the controller itself, the cache memory gives it a very, very high level of throughput. The system is running at a much higher level of throughput than any [other] system out there."

"The purpose is to eliminate the bottleneck in the disk controller," Sautter said. "All 386 systems [except ours] have that bottleneck imposed by the slow speed of the subsystem. If Windows needs to swap a page on the disk, it has to sit and wait... Even a 20-MHz system will outperform the 33 MHz."

The new systems support all 386 and IBM PC/AT hardware and software, including AutoCAD, Unix/Xenix, Windows/386, OS/2, and Novell Netware.

The floor-standing systems come standard with 1 megabyte of memory expandable to 16 megabytes on the system board, seven drive bays, and eight



The Trillian Dualcache 386/25's four-way memory cache ensures zero wait states.

expansion slots. Also standard are 5¼-inch and 3½-inch floppy drives and one parallel and two serial ports. The systems are socketed for both the Intel 80386 and Weitek 3167 math coprocessors. Hard disks range from 70 megabytes to 2.4 gigabytes, and display options include a 14-inch full-screen monochrome monitor and 14-inch multifrequency color VGA monitors with resolutions ranging from 640 by 480 pixels to 1,024 by 768 pixels.

Available now, prices begin at \$3,999 for the 386/20 Model 70F—which includes a 14-inch monochrome monitor and a 70-megabyte hard disk drive with an ESDI 1:1 caching disk controller—and range up to \$11,499 for the 25-MHz Model 760F, which includes a 760-megabyte hard disk with an ESDI 1:1 caching disk controller and 14-inch VGA monitor, a VGA adapter, and 1,024 by 768 pixels in 16 colors.

Trillian Computer Corp., 372 Turquoise St., Milpitas, CA 95035; (408) 942-1791.

Jlaser 5 Controller Board Uses EMS Memory to Print Full-Page Graphics

BY BOB PONTING

Tall Tree Systems unveiled a new member of the Jlaser printer controller family at Comdex last week that prints full-page graphics with up to 256 tones of gray using the PC's EMS memory to form the page image.

Called the Jlaser 5, the board can be installed in any AT compatible and requires 2 megabytes of EMS memory. It comes with a video interface that installs in Hewlett-Packard LaserJet Series II printers.

The Jlaser 5 modulates the LaserJet's laser beam to achieve an effective resolution of 4,800 horizontal dots per inch (dpi) by 300 vertical dpi. With the higher horizontal resolution, it can

print 256 gray tones with a 53-line-per-inch halftone screen and 128 tones with a 106-line-per-inch screen. With the Jlaser 5, a LaserJet prints graphics with 16 times more resolution and from two to six times faster.

The Jlaser 5 comes with the LaserJet video interface card, cable, Bitstream Fontware, drivers for Ventura Publisher and Windows, software emulators for HPGL and HP PCL, and Jbanner, an image and text printing utility. It sells for \$399 and is also available for a 2-megabyte EMS board for \$799. It will ship next month.

Tall Tree Systems, P.O. Box 50690, 2585 E. Bayshore Road, Palo Alto, CA 94303; (415) 493-1980.

VESA Adopts Extended-VGA Specs

Subcommittees to Discuss Further Extensions to VGA and 8514/A

BY ED FOSTER

CHICAGO — In a general meeting here prior to Comdex, the Video Electronics Standards Association (VESA) reaffirmed its adoption of an extended-VGA mode and set up several subcommittees to explore further standardization of extensions to VGA and 8514/A graphics.

VESA members have now agreed on specifications for an extended-VGA mode displaying

800-by-600 resolution with 16 colors. VESA set up two additional subcommittees to discuss monitor timing standards and 8514/A extension standards.

Committee members seemed close to a consensus on a Western Digital proposal to standardize a common range of memory addresses for 8514/A-compatible boards on an AT bus, according to Jim Anderson, marketing manager for Western Digital Imaging, in Mountain View, California, and chairman

of the 8514/A subcommittee.

A thorny issue looming for the 8514/A subcommittee, however, is whether to base the extensions on IBM-compatible hardware registers or on the TI 34010 graphics chip already used by several manufacturers, including Compaq, for 8514/A emulation products. "That's still an issue the subcommittee is going to have to deal with," said Kim Federico, product manager at Video Seven, in Fremont, California.

Zenith Jumps on 33-MHz 386 System Bandwagon

BY SCOTT MACE

Zenith Data Systems will begin shipping this month FCC Class A-approved models of the Z-386/33 computer system which will deliver more than 8 MIPS of performance.

"The race for greater computing speed isn't on clock speed alone," said John P. Frank, president of Zenith Data

Systems. "The system has to be optimized throughout to accommodate the 33-MHz speed."

A high-speed memory cache and disk controller contribute to zero-wait-state performance and make possible the use of slower but less expensive and more widely available 100-nanosecond chips, according to Frank.

The Z-386/33 system incorporates its own 16-layer cache write queue. The new memory scheme allows the system to hold up to 16 times the data of competing cache systems before being forced to update system memory. Zenith mounts its cache on a removable card, which allows the user to upgrade the cache memory to 256K or more in the future.

In addition to the standard 2 megabytes of system memory and 16K of cache memory, the Z-386/33 computer system

comes with an ESDI disk controller card that provides 1:1 disk interleave. All three models of the 386 system include a 3½-inch 1.44-megabyte floppy disk drive and space for three additional devices.

The Z-386/33 system board has a total of seven slots with five available for expansion. Three of the open slots are 32-bit superset slots, which also offer compatibility with 8-bit and 16-bit AT cards.

All hard disk drive models are equipped with Zenith's VGA video card and Microsoft Windows/386, OS/2 1.1 is available as an option.

The Z-386/33 Model 150, with a 150-megabyte hard disk and an average access of 18 milliseconds, will be available for \$11,499 at the end of this month. The Model 320, with a 320-megabyte hard disk rated at 16 milliseconds, will sell for \$13,499.

The Z-386/33 Model 1, which lets system integrators add their own video card and hard disks, will sell for \$7,999. The Models 320 and 1 will both be available in the second quarter.

Zenith Data Systems, 1000 Milwaukee Ave., Glenview, IL 60025; (800) 842-9000, ext. 1.



The Zenith Z-386/33 system incorporates a 16-layer cache write queue.

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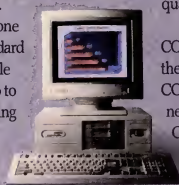
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Canon Printers Offer Users Nine Scalable Fonts

BY ED FOSTER

CHICAGO — Canon U.S.A. Inc. formally unveiled last week an enhanced line of laser printers featuring the capability to scale fonts to any desired size.

The Canon LBP-8 Mark III series, although based on the same Canon SX laser printer engine as its predecessor, employs a new controller that can scale, angle, and shade fonts that are based on a vector outline. The printer has nine built-in scalable fonts and eight bit-mapped fonts which are not scalable.

The basic Mark III model is priced at \$2,995. The \$3,995 Mark III T provides dual paper cassettes, and the \$4,995 Mark III R adds dual-sided printing as well as dual cassettes. All three models come with 1½ mega-



The Canon Mark III printer series employs a new controller that can scale, angle, and shade fonts that are based on a vector outline.

bytes of built-in memory, upgradable to 4½ megabytes.

As expected, Canon officials said they plan to make a Postscript option available using a plug-in card. The company would not commit to a time frame for releasing the Postscript option but said it hoped to have it available in the fourth quarter.

Contrary to industry specula-

tion, Canon did not announce plans to offer a Postscript clone as well. "Genuine Postscript offers more than emulations," said Arnie Peters, marketing manager of Canon's printer division. "We at Canon will be pleased to offer the real thing," Peters said.

Canon U.S.A. Inc., 1 Canon Plaza, Lake Success, NY 11042-1113; (516) 488-6700.

Sampo Unveils High-Resolution Monitors

BY YVONNE LEE

Sampo Corporation of America unveiled at Comdex last week a new line of high-resolution color and monochrome monitors.

Priced from \$789 to \$2,695, the product line includes a 14-inch general-purpose color monitor, two 20-inch high-resolution color monitors, and two 20-inch monochrome monitors.

The Alphacolor offers resolutions from 320 by 200 up to 800 by 600 with a .31mm dot pitch, the company said. It is compatible with MDA, HGC, CGA, EGA, VGA, MCGA, VGA, Super VGA, and Macintosh II

graphics standards. It offers an auto-sizing default switch to adjust the image size when switching from EGA to VGA as well as a switch that allows the user to select between amber, green, or white phosphors. The Alphacolor sells for \$795.

At \$1,995, the Trisync 20-inch color monitor is compatible with VGA, 8514A, or Mac II graphics standards.

A second color monitor, the \$2,695 Prismview, is a fixed-frequency model offering 1,280-by-1,024-pixel resolution. The Prismview is particularly well suited to CAD use, the company said.

Both monochrome monitors are intended for the desktop publishing arena, according to Sampo, offering a resolution of 1,280 by 960. The \$995 Officopro II is an ECL two-color monitor. The Officopro IIa is an analog monochrome monitor capable of displaying up to 256 shades of gray and is suitable for use with a scanner, according to Sampo. The Officopro IIa has a retail price of \$1,149.

All products are scheduled to ship in May.

Sampo Corporation of America, 5550 Peachtree Industrial Blvd., Norcross, GA 30071; (404) 449-6220.

Selko Color Monitors Support 1,024 by 768 Pixels

BY PATRICIA J. PANE

Seiko Instruments U.S.A. Inc. introduced last week at Comdex three color monitors, including two that support 1,024-by-768 resolution in non-interlaced display mode.

The 14-inch CM-1450 and the 20-inch CM-2050 are designed for desktop publishing, presentation graphics, and CAD applications on PC-compatible systems. The CM-2050 can also be used with the Apple Mac II. The 14-inch CM-1445 works

exclusively with the Mac II.

All the monitors use Sony Trinitron CRTs, and the CM-2050 and CM-1450 have linear-tracking capabilities. The CM-2050 and CM-1450 monitors support VGA, Super VGA, IBM 8514A, and 1,024-by-768 non-interlaced standards, Seiko said.

Both the CM-2050 and CM-1445 monitors support the Mac II 640-by-480 video standard when used with a Mac or compatible video card. The CM-2050 also supports 1,024-by-768 resolution on the Mac II. The CM-1450 will sell for less than \$1,200; the CM-1445 will cost less than \$900; and the CM-2050 will list for less than \$3,000. The CM-1450 and CM-1445 will be available in the third quarter, while the CM-2050 will be available in the fourth quarter.

Seiko Instruments U.S.A. Inc., 1144 Ringwood Court, San Jose, CA 95131; (408) 922-5819.

Ricoh IS11 Desktop Flatbed Scanner Delivers 450 DPI in 64 Gray Scales

Ricoh Corp. previewed at Comdex last week a new desktop gray-scale scanning engine that delivers up to 450 dots per inch in 64 gray scales.

The letter-size flatbed scanner, the IS11, is capable of scanning a full page at 300 dpi with 64 levels of gray in 14 seconds, the company said. It offers four output modes: gray-scale, white-to-black inversion, dithered pseudo gray-scale, and line art. It can also deliver either

4- or 6-bit gray-scale PELS. The scanner can deliver data in 27 resolutions from 50 to 450 dpi, making it compatible with a wide range of output devices. It also has a low-resolution scanning mode suitable for screen previews that takes only seven seconds for a full-page scan.

The scanner is now shipping. Ricoh Corp., 55 Dedrick Place, West Caldwell, NJ 07060; (201) 882-2077.

— Bob Poming

Amiga 286 Bridgeboard Accepts AT Add-On Cards

Gives Amiga 2000 Series DOS Compatibility

BY SCOTT MACE

A 286-based board that gives the Amiga 2000 series compatibility with MS-DOS programs written for the IBM PC AT was announced recently by Commodore Business Machines.

The Commodore A286BD Bridgeboard expansion card plugs directly into the Bridgeboard expansion slot in the Commodore Amiga 2000, 2000HD, or 2500 and provides access to the vast library of MS-DOS software and hardware, Commodore said.

"We are committed to providing Amiga users with a wide variety of computing options," said David Archambault, director of product marketing for Commodore Business Machines.

The Amiga's multitasking environment lets users run an MS-DOS application in one

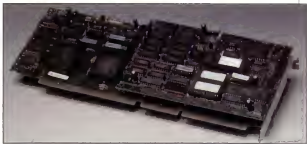
window while Amiga applications run simultaneously in other windows.

The Bridgeboard contains an 80286 microprocessor running at 8 MHz, 1 megabyte of RAM, and a socket for a 80287 math coprocessor, the company said. The Bridgeboard allows installation of AT-compatible hardware add-ons in up to three slots on the Amiga motherboard. The system also allows a single hard disk drive to be shared between MS-DOS and Amiga-DOS. In addition, the Amiga mouse is capable of emulating the Microsoft mouse.

The A286BD comes standard with a 1.2-megabyte 5¼-inch floppy disk drive.

The A286BD Bridgeboard sells for \$1,599.

Commodore Business Machines Inc., 1200 Wilson Drive, West Chester, PA 19380; (215) 431-9100.



The Commodore A286BD Bridgeboard coprocessor card plugs into the Bridgeboard expansion slot in the Commodore Amiga 2000.

Microtek Lab 300-DPI Color Scanner Can Support up to 256 Gray Scales

BY MARK BROWNSTEIN

CHICAGO — Microtek Lab Inc. introduced at Comdex last week a color scanner as well as a pair of gray-scale scanners with resolutions of 400 dots per inch (dpi) and 300 dpi.

The color scanner will scan at resolutions of 300 dpi and support up to 256 gray scales, the company said.

A full-page color image can be scanned in approximately 90 seconds.

In addition, the scanner can be used as a monochrome scanner with the same resolution and gray-scale support. A version of the scanner for either the PC or the Macintosh will be available, with shipments planned for this summer.

Software included with the scanner will provide full control for scanning modes and will also provide tools for editing and manipulating the scanned images, the company said.

The company plans to sell the color scanner at a price "below \$4,000," according to a

Microtek spokesman.

In addition to the new color scanner, the company will offer a product line with the MSF400G, a 400-dpi monochrome scanner that is designed for high-end graphics and publishing applications that require the higher resolution. The MSF400G will be priced at \$3,995.

The MSF300G is a 300-dpi scanner that can scan up to 256 gray scales. The product is now shipping and is available for \$2,195.

A sheet-fed scanner designed for optical character recognition and desktop publishing applications was also announced. The MS-11 scanner provides 300-dpi resolution but does not include gray-scale support. In addition, the scanner is sheet-fed, rather than flatbed.

The MS-11 will be priced at \$1,495.

No shipping date was available at press time.

Microtek Lab Inc., 680 Knox St., Torrance, CA 90502; (213) 321-2121.

Goldstar Introduces Five PC Compatibles at Comdex

Goldstar Technology Inc. introduced at Comdex last week five PC-compatible systems, including a 286-based portable.

In addition, Goldstar announced an 8514/A-compatible monitor, the Model 1610.

The new PC compatibles include the GS100, a 10-MHz XT-compatible machine; the GS200, a 10-MHz 80286-based system; the GS230, a 16-MHz 80286-based computer; the GS320, a 20-MHz 80386-based system; and the GS500, a portable computer with a 12-

MHz 80286 CPU.

The GS100, GS200, and GS230 come with 640K of RAM, while the GS320 is equipped with 1 megabyte of RAM. Each system includes a floppy drive and one serial and one parallel port.

The AC-powered GS500 portable includes an EGA gas plasma display, a 20-megabyte hard disk, a built-in 3½-inch floppy drive, and serial and parallel ports.

The Model 1610 monitor requires a PS/2 or PC-compatible system with an 8514/A-compatible video card. Priced at

\$1,199, the monitor is slated to ship this month.

The GS100 will list for \$945, the GS200 for \$1,295, and the GS230 for \$2,195. The 20-MHz 80386 machine, the GS320, will sell for \$3,195. The laptop-size desktop computer, the GS500, will list for \$3,895. All systems will be available in July.

Goldstar Technology Inc., 1130 E. Arques Ave., Sunnyvale, CA 94086; (408) 737-8575.

— Patricia J. Paine

Toshiba Announces CD ROM Drive That Runs With Mac or PC

A CD ROM drive that can be used with either an IBM PC-compatible computer or a Macintosh computer was announced last month by Toshiba America Inc.

The XM-5100A drive is an external CD ROM drive that includes a power supply and will be offered with installation kits that allow it to run with either a Mac or PC or both. The drive features an embedded SCSI interface that allows connection to a Toshiba host adapter. It provides an average access time of 380 milliseconds and features a 172K-per-second data-transfer rate. A 64K data buffer is also built into the drive.

Installation kits — which include the host adapter (SCSI interface cards), SCSI cable, and operating instructions — will allow use of the drive from either hardware platform. MS-DOS extensions will be included.

The XM-5100A will be priced at \$650 and is scheduled to begin shipping this month. Pricing was not available for the installation kits.

Toshiba America Inc., Disk Products Division, 9740 Irvine Blvd., Irvine, CA 92718; (714) 583-3108.

— Mark Brownstein

Megamate Drive Offers Fast Rate Of Data Transfer

Microsolutions introduced last week a 2.88-megabyte 3½-inch external floppy drive that offers data-transfer rates nearly four times that of 720K drives.

The disk drive will retail for about \$395 and comes with a controller card and software that allow it to run 720K and 1.44-megabyte disks.

The Megamate 2.88" controller card, available separately for \$149, will support up to four floppy drives. It lets users specify the boot drive and automatically recognizes a disk's format density, said Microsolutions' president Ron Proesel.

However, disks to be formatted at the 2.88-megabyte density require special media because the drive won't format 1.44-megabyte disks at the 2.88-megabyte density, according to Proesel. Media for the drives will retail for about \$7 per disk.

The drive transfers data at about four times the rate of 720K 3½-inch drives, Proesel said. The external drive, which will ship this quarter, consumes 5 watts and includes the capability to read and run 3½-inch CP/M disks.

Microsolutions, 132 W. Lincoln Way, De Kalb, IL 60115; (815) 756-3411.

— Jeff Angus

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OUR SYSTEM 310 IS FASTER THAN A BAT OUT OF HELL.

If you've been looking at 386-based computers, you obviously feel the need for speed. Something the Dell System 310 delivers in spades.

In fact, the System 310 has more speed than even the most seasoned 386-users have come to expect.

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RAM and interleaved memory, the 310 not only delivers the aforementioned speed, but enough horsepower to do everything from CAD/CAM to megaspreadsheets to databases the size of the Manhattan Yellow Pages.

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Do you do a lot of spreadsheets? There's an optional Intel 80387 or WEITEK 3167 math coprocessor available.

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ESX	\$4,699 \$6,199	\$5,199 \$6,499		
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DISCLAIMER: System 310 is a photograph with optional extra that some computer retailers won't even recognize.

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TECH TALK ■ By STEVE GIBSON

Language Subprograms Benefit From More Independence

Last week we saw that the design of computer languages centers around a fundamental trade-off: Languages that can be efficiently "mapped" by their compiler or interpreter onto the true physical architectures of microprocessors generally yield higher run times at the expense of being harder to use. On the other hand,

higher-level languages that deliver a more idealized and easy-to-use computing model to the programmer sacrifice execution efficiency.

Nonetheless, the computational power of personal computers is fueling a strong movement toward higher-level modes of linguistic expression. The economics of the personal computer industry are placing increasing weight upon powerful functionality and the ever-competitive

time-to-market, and high-level languages are far better at supporting the bureaucratic "by committee" style of product development, which our maturing market is engendering.

In what ways have our languages been evolving? The earliest high-level language compilers did little more than allow the programmer to declare the layout of the project's memory usage, then generate a fixed sequence of low-level instructions

for each instance of a higher-level instruction.

The point is that these languages brought little value to the party. They modeled a better machine than the real one, but only by "macro-izing" the raw low-level instructions in the creation of synthetic instructions that were a bit cleaner and looked a lot prettier.

Computer languages have largely been about labeling things. Just as English is big on labeling things in order to enable us to make reference to them in sentences, a large part of a programmer's job involves inventing logical names for the items of data that he and the computer need to work with.

Once these data items have been invented and declared, the programmer's task is to describe what the computer should do with them.

As the tasks that programs were being asked to perform became more complex, the coordination and management of the increasingly huge chunks of code grew into a full-time job.

To help ease this management burden, it became convenient to divide large programs into smaller "subprograms." Since complex programs typically did many things, like disk input/output, screen display, mouse reading, etc., subprograms were simply chunks of program code that handled some single aspect of the whole.

Now this was not such a big deal since all but the very earliest languages have supported the concept of subroutines, but a significant breakthrough in computing science occurred when these smaller subprograms achieved some independence. By this I mean that subprograms became empowered to create, own, and maintain data items that were their private property and that remained unseen by the rest of the system.

As we will see, the simple mechanism of internal privacy has evolved into an entire computing religion of its own and is one important aspect of the new term encapsulation.

In essence, the new-found privacy given to these subprograms allowed them to better perform whatever task they were assigned by autonomously drawing upon the memory resources of the host computer.

In a programming language with encapsulation, it's possible, for example, to give a sorting subprogram a list of things to sort without concern over what additional system resources the sorting subprogram might require in order to perform its task.

Implicit in the concept of encapsulation is another important concept known as scope.

We say that the scope of the data items created or used by a subprogram is "local" to that subprogram. This means that although other subprograms might use identical labels or names to refer to their own private data items, the system understands that data items declared by a subprogram are implicitly for that subprogram's private (local) use and for all intents and purposes do not exist outside the scope or extent of that subprogram.

We'll continue this exploration next week.

Steve Gibson is the developer and publisher of Spin Rite and president of Gibson Research Corp. of Irvine, California. The views expressed are his own.

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MACINTOSH NEWS

CMS Introduces 2,400-BPS Internal Modem for Mac II

BY PATRICIA J. PANE

CMS Enhancements Inc. introduced last week a 2,400-bits-per-second internal modem for the Apple Macintosh II, Ix, and Ilex as well as five additions to its Platinum Series of external SCSI hard disk subsystems for the Mac Plus, SE, SE/30, II, Ix, and Ilex.

The 2400-BMI modem is a full-function 2,400-bps internal modem that uses advanced X.P.C. error-correction protocol and supports the AT command set, CMS said. The modem provides compatibility with Mi-

crosoft Works, Mac Terminal, Microphone II, Red Ryder, and all versions of Smartcom, the company said.

"If you're on an Appletalk network and you're in Singapore and want to access the modem and network installed in San Jose, you can do that," said Tom Merkle, accessory division product manager for CMS.

The 2400-BMI plugs directly into any slot and does not require any adapters, switches, or cables, the company said.



Platinum Series external SCSI hard drives sit under the Macintosh in 2-inch cabinets.

The 2400-BMI will be available May 15 at retail for \$399, the company said.

The new Platinum Series external SCSI hard disk subsystems are housed in 2-inch cabinets and are available in five models, ranging in capacity from 40 to 135 megabytes, according to CMS.

All of the new models are available now, the company said. The PD 40 sells for \$1,245, the PD 65 costs \$1,595, and the PD 80 lists for \$2,295. The PD 135 costs \$2,295, and the PD 134 costs \$2,495.

CMS Enhancements Inc., 1372 Valencia Ave., Tustin, CA 92680; (714) 259-9555.

Fujitsu Enters Mac Ring With Printer, Floppy Drive

BY LAURIE FLYNN

CHICAGO — In its first move in the Macintosh market, Fujitsu America Inc. introduced last week at Comdex an 800K floppy drive and a Mac-compatible laser printer.

The 3½-inch floppy drive is an external device that works with the Macintosh Plus and SE as well as with prior Mac models. The list price of the drive is \$265, approximately 40 percent below Apple's price of about \$400 for a comparable system. The drive comes with a standard 12-month warranty, though for a limited time Fujitsu is offering an additional six-month warranty.

The product, called the Fujitsu America 800K External Disk Drive, is scheduled for release in June. The drive can be

mounted vertically or horizontally with a stand supplied by the company.

The Macintosh-compatible printer, called the RX7100PS, comes with 2 or 4 megabytes of RAM and includes 35 resident fonts, the company said. The printer includes dual paper trays and has built-in Appletalk, RS-232, RS-422 serial, and parallel ports.

The price is \$4,495 for a 2-megabyte version and \$4,995 for 4 megabytes. While the 2-megabyte version is already available for the IBM PC, both models now support the Mac. The 2-megabyte model is available now, and the 4-megabyte model will be released in June, the company said.

Fujitsu America Inc., 3055 Orchard Drive, San Jose, CA 95134; (408) 432-1300.

Timeworks' 'Publish It' Integrates Drawing, Word Processing Functions

BY LAURIE FLYNN

CHICAGO — Timeworks Inc. announced last week at Macdex a desktop publishing program for the Macintosh that provides integrated drawing and word processing functions.

The \$395 program, which is called Publish It, is based on the company's existing programs designed for IBM PCs and compatibles and Apple II, according to the company. Publish It supports font sizes up to 127 points and permits users to rotate and overlap text and add special effects. In addition, the program automatically wraps text around objects and supports magnification of up to 800 percent, according to the company.

Also included in the desktop publishing program are support for multiple page views, eight views that layers, and multiple document windows, according to the company. The program features over 70 document templates as well as user-definable style sheets. Publish It also contains a built-in word processor that includes a spelling checker and thesaurus.

With the Publish It desktop publishing package, users will be able to import graphics from the major graphics programs and will be able to accept scanned images in the encapsulated Postscript, TIFF, and PICT formats, according to Timeworks.

Timeworks Inc., 444 Lake Cook Road, Deerfield, IL 60015; (312) 948-9200.

SAS Previews Its Mac Statistics Package

JMP Combines Spreadsheet, Data Analysis

BY PEGGY WATT

SAN FRANCISCO — SAS Institute Inc. offered a preview last week of a Macintosh statistics package, called JMP, that combines spreadsheet, data analysis, and graphing features and is scheduled to ship this summer.

Pricing, including site licenses, is scheduled to be announced at shipment time.

Speaking to nearly 4,000 customers attending SAS Institute's annual users' group conference here, W.E. Swain, SAS' marketing communications manager, said JMP is not just an implementation of SAS on the Mac. The current SAS line of statistical, analysis, and graphics packages runs on a variety of platforms, from the PC to Unix systems and IBM mainframes.

Users enter data on work-

sheetlike tables and can generate graphs for all or some of the variables. JMP includes a calculator window to let the user define formulas within a data table or accepts SAS Export Files from other SAS platforms.

The program contains six statistical platforms, which the user defines to graph data. They include several graph axes options and search and specify features. A spin function shows graphs from several 3-D angles so the user can visually identify clusters or trends.

SAS' first Mac product was well-received by attendees. "I think a lot of people will be using this," said John W. Olson, a McDonnell Douglas Co. program manager and Mac user from Mesa, Arizona.

SAS Institute Inc., Box 8000, Cary, NC 27511; (919) 467-8000.

Postscript Clone Printer Takes Aim at Laserwriter

BY BOB PONTING

Dass Group Technologies Inc. is now shipping a Postscript clone laser printer that costs less than the Apple Laserwriter II NT yet is said to have better pixel definition and five times the throughput.

The Megawriter PS printer gains its speed advantage with a 32-bit Weitek XL 8200 raster image processor, said John Hinton, president of Dass Group.

The printer uses a Postscript-compatible interpreter provided by Weitek with the chip set and includes 35 resident Bitstream outline fonts, Hinton said.

The printer's 300-dpi Casio laser engine uses a liquid-crystal-array shutter, minimizing mechanical parts and providing

sharper imaging capabilities than more conventional engines that use movable mirrors, Hinton said.

The printer comes with 3 megabytes of RAM for page imaging and storing downloadable font outlines, 1 megabyte more than the Laserwriter II NT. And it has a much smaller footprint and weighs less than the Laserwriter, Hinton said.

The Megawriter PS includes RS-232, Centronics parallel, and Appletalk interfaces. It can print up to five times faster than the Laserwriter II NT and 50 percent faster than Apple's top-



The Megawriter PS uses a 32-bit Weitek XL 8200 raster image processor.

of-the-line NTX, Hinton said. It costs \$4,295.

Dass Group Technologies Inc., 9007 Independence Ave., Canoga Park, CA 91304; (818) 882-7021.

Superglue II Print-to-Disk Utility Includes Notes Feature

BY YVONNE LEE

Solutions International recently announced a new version of Superglue II, its Mac print-to-disk utility that offers a feature for attaching several layers of comments to Superglue files.

The new Glueto files feature lets notes appear as circles in Superglue files, said Mary Evslin, president of Solutions International. When using the Superglue file access, the notes can be read by double-clicking on the circle, causing a scrollable dialog box containing the notes to appear. When Glueto files are printed, the Superglue file ap-

pears in the top two-thirds of the page, with the notes in the bottom third. Text or graphics may be placed in a single Glueto note but not both text and graphics.

Superglue II includes a font lock that identifies fonts by name as well as ID number, said Tom Evslin, president of Solutions Inc., the developers of Superglue II. This allows font substitution when the font ID has been changed by the user.

Superglue II also allows users to append existing Superglue files, and it will save pages from a document as a folder of separate PICT documents.

Superglue II includes a One-Timer feature that remembers which printer is selected before Superglue's Imagesaver is selected to print to disk and selects that printer in the Chooser dialog box.

Registered owners of Superglue can upgrade to Superglue II for \$25 plus \$4 postage and handling. Customers who purchase the older version of Superglue after April 6 can receive a free upgrade. Superglue II v. 1.0, Glueto files will be available in May for \$119.95.

Solutions International, 30 Commerce St., Williston, VT 05495; (802) 658-5506.

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NEC

Circle 13 on Reader Service

Microport Has Filed for Chapter 11

Competitors Move In to Offer Deals to Woo Microport's Customers

BY MARTIN MARSHALL

Microport Systems Inc. is continuing to sell and service its products, although the company recently filed for Chapter 11 protection from its creditors, a company spokesman said last week.

Microport, which has supplied the System V Unix for Intel 286- and 386-based systems, is still operating out of a Teledyne sales office, in San Jose, California, said Brian Thistha, a sales representative who was answering the company's phone last week. The office is at 550 E. Brokaw Road, and the phone number is (408) 441-0140.

I'M NOT DEAD YET. Meanwhile,

the remaining competitors in the System-V-on-Intel-architecture area are wooing Microport's installed base of customers, with aggressive trade-in policies.

The most aggressive offer is from Bell Technologies of Fremont, California. Company president Dmitri Rotow said that Bell Tech is offering until July 4 its operating system plus development package for a list price of \$595, down from \$1,490.

The offer is extended only to current Microport software owners and only to those who own the 386 version of Microport's software. It requires a trade-in of both the Microport operating environment and de-

velopment package.

The package will be licensed for as many users as on the Microport license. It includes the 1.1-volume set of manuals, the System V.3.2 environment, Streams, TLI, RFS, and a number of development tools such as the C compiler, libraries, and symbolic debugger. It also includes a 2K fast-file system.

The Santa Cruz Operation plans no special deal as a result of the Microport filing, but has a long-standing program that offers a 50-percent discount to those trading in competing operating environments. "We started the program back in 1983, when people began trading in IBM Xenix," said David Bernstein, program manager for systems software at SCO. SCO requires a proof of purchase of the competing software and offers separate discounts for the operating system and the development environment. Both 286- and 386-based versions can participate in the program.

AT&T Ships Enhanced 3B2 Multiuser Systems

BY MARTIN MARSHALL

The capability to diagnose and maintain a system remotely, better balancing between user and system workloads, the incorporation of multiprocessing, and a higher-performance top-end system are among the hallmarks of the new 1000 series of AT&T's 3B2 family of multiuser systems.

The new machines, which began shipping next month, include the 3B2/1000 Models 60, 70, and 80. Each comes with Unix System V, Release 3.2.2, which contains the latest version of the merged Unix/Xenix operating system. This version features the first appearance of AT&T's multiprocessing provisions.

The new machines are capable of supporting multiprocessing using a processor board that AT&T calls a processing element. They are all expandable to 64 megabytes of main memory, and they each have a new 25-slot back plane for expansion.

The top-of-the-line Model 80 delivers 32 MIPS of processing and supports more than 100 users, according to AT&T. Its base unit includes 16 megabytes

of ECC RAM, two 300-megabyte hard disks, a 720K floppy, a SCSI host adapter card, a 120-megabyte tape drive, a 24-MHz system board, and a processing element with a 32-bit WE 32206 MAU microprocessor.

The price of the base unit is \$74,900. Two additional processing elements, priced at \$6,500 each, boost performance to 16.0 MIPS.

The Model 60 supports 64 simultaneous users with a 22-MHz system board and 4 megabytes of RAM, one 300-megabyte hard drive, a 720K floppy, a 120-megabyte tape drive, and a SCSI adapter for a price tag of \$39,900.

The Model 70 supports 80 users and is configured like the Model 80, except that its system board is only 22 MHz and does not sport the plug-in processing element.

Fast cache RAM has been added to the 3B2/1000 models to speed processor performance. The Models 60 and 70 have 4K of cache, while the Model 80 has 8K.

Upgrading to the 3B2/1000 Model 80 from 3B2 600/700 series systems is accomplished with a migration kit that contains a 24-MHz system board, processing element kit, 3B2/1000 back plane, Unix V.3.2.2, and documentation for \$21,000.

AT&T also introduced color terminals to the 3B2 line, pricing its Model 615 CMT Color Multitasking Terminal at \$650 for the monitor, \$525 for the controller/base, and \$140 for a 98-key keyboard.

AT&T 1776 On The Green, Morristown, NJ 07960; (201) 898-6500.

THEY CIRCLE ABOVE. Interactive Systems Corp. (ISC) of Santa Monica, California, also plans to offer existing Microport customers a substantial discount. Interactive will offer a 75-percent credit of the price of Microport software when the user converts to Interactive's 386ix operating environment, according to ISC's Kurt Lynn, general manager of the distribution division. "This applies to end-users and resellers, and it covers conversion from either the 286 or 386 versions," Lynn said.

Interactive will also honor existing Microport service contracts held by those converting to 386ix. "If, for example, a user has six months left on his Microport service contract, then we'll give him six months of service on 386ix," Lynn said.

Lynn also pointed out that, because both the Microport and Interactive's versions are closely tied to AT&T's version of System V/386, many applications programs intended for the Microport environment will run without change on the Interactive environment.

As of last week, speculation on the Usenet among Microport users centered around the future of Microport source code for its device drivers. "Without a device of device drivers, users have to write their own device drivers for new equipment," said one user. New device drivers would be needed whenever the user wanted to change terminals, disks, or memory to a new product for which a driver had not yet been written.

SPEC Status Report

The Systems Performance Evaluation Cooperative, an industry panel set up to create consensus standards for benchmarking software performance on Unix systems, has released its first progress report on the status of proposed benchmarking standards. Here are the proposed candidates, those in progress, and those rejected:

Proposed Candidates (not yet distributed):

Nike	An implicit finite element analysis program
Dyna 3D	An explicit finite element analysis program
Molecular	Molecular modeling
Spot	Scientific Modeling
Genzhi	Fortran floating-point-intensive
Compress	File compression, large memory access
Findpole	Seismic analysis
Los Alamos	Sci comp kernels
Gbench	X-Window client/server
Simple	Fortran explicit hydro vector
Tex	Text processor (portability problems)
Panzer	Chip placement tool

Rejected:

RISC IC, Bison, GNU Chess, GNU Grep, Livermore Loops

In Modify Loop:

Gcc, Expresso, Timberwolf, Spice 2G6, Spice 3B1, Doduc, Nasker, Li, Eqlont

Deferred:

Ghostscript, Gawk, Musbus 5.2

SAS Institute Will Port Its Software to Apollo Systems

The SAS Institute, a major vendor of data analysis and decision support software on IBM mainframes, announced last week it will port software to Apollo workstations using the Motorola 680X0 processors.

The SAS System includes data entry, retrieval, and management; statistical and mathematical design and analysis; business planning and forecasting; operations research and

project management; and applications development.

It will be ported to Apollo's Series 3000, 3500, and 4500 workstations. Porting of the software is expected to be completed and ready for shipment in the fourth quarter. Pricing has yet to be determined.

SAS Institute, SAS Circle, Box 8000, Cary, NC 27512; (919) 467-8000.

— Martin Marshall

Helios Announces Reversible Add-On RAM Cards For Sun-3/50

Helios Systems Inc. has offered 4- and 8-megabyte add-on memory boards for Sun-3/50 systems before, but those products were soldered to the motherboards in a process that voided the Sun Microsystems service warranty.

Last week, Helios showed new reversible add-on memory boards that do not void Sun's warranties.

The new models, the 4-megabyte MS50A-4 and the 8-megabyte MS50A-8, are being offered at introductory prices of \$1,700 and \$3,300, respectively,

through May 31.

The memory add-ons enable the Sun-3/50, which was not designed for memory upgrade, to jump from its 4-megabyte memory limitation up to 8 or 12 megabytes.

Since more swap space is available in RAM with the greater memory capacity, the operation of many memory-intensive applications is also speeded greatly.

Helios Systems Inc., 1996 Lundy Ave., San Jose, CA 95131; (408) 432-0292.

— Martin Marshall



Multiprocessing modules boost performance of AT&T's 3B2/1000 Model 80 to 16.0 MIPS.

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INDUSTRY

More Software Companies Turning to Patents

BY RACHEL PARKER

The debate over protecting software innovation from imitation is heating up, as more companies turn to patents to cover their products.

Earlier this year, Advanced Software of Sunnyvale, California, was awarded a patent on its document-comparison technology. (See "Advanced Software Wins Patent for Document-Tracking Method," April 10, Page 8.) The patent, originally filed in 1986, gives Advanced Software broad protection over its method of comparing text and showing changes made to documents. The patented technology is sold as the Docucomp text-comparison package.

Unlike a copyright, a patent protects an invention from others who may come up with a similar idea independently.

"We filed the patent originally because we did not want anyone to steal the way we had done this," said Larry Light-

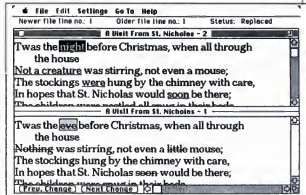
man, president of Advanced Software. "Copyright does not protect against that."

While Advanced Software does not plan to prevent other software companies from including document comparison features in their products, it does want to earn some compensation for its innovation. With a patent in hand, Advanced could force other companies to pay a royalty or change their products so they do not infringe the patented technology.

That power has struck a nerve with software companies, which have traditionally innovated and borrowed from one another's work.

"The software industry has become a veritable minefield of patents," said R. Duff Thompson, general counsel for Word Perfect Corp. "Rather than writing good code, people are filing patents."

With patents part of the intellectual property picture, software companies will have to



Advanced Software was recently awarded a broad patent on its document-comparison technology called Docucomp.

be much more careful in the way they design software and will have to spend much more time arguing with competitors rather than programming. Thompson added, "Patents will pop up, and people will argue that they have the right to preclude others' use of the technology. We will go out to find prior art to disqualify these patents. It will be a never-ending round of assertion of rights."

Part of the controversy over the patents that are being awarded stems from the U.S. Patent Office's unfamiliarity with software technology.

"Because this is the first patent of its kind, the Patent Office allowed very broad claims," said Advanced Software's Lightman.

That is how the U.S. Patent Office typically operates. "In any field, when new technical breakthroughs are made, the umbrella patents are very pow-

erful," said John P. Sumner, a computer lawyer in Minneapolis. "That is the reward of the patent."

While the broad patent protection granted to Advanced Software has startled Thompson and others in the industry, Sumner believes that the software companies will survive the patent age. First, competitors can challenge the broad patents by asking the Patent Office to rescind the invention in light of prior examples of the technology that they provide.

If the Patent Office agrees that the patented invention is only an improvement on an existing technology, it may narrow the claims substantially, Sumner said. But beyond the adjustments to patents, Sumner believes that PC software companies will do what larger system companies like IBM and Honeywell have done for years: patent everything.

Mac Vendors Try to Cope With Proliferation of Shows

BY LAURIE FLYNN

CHICAGO — The proliferation of trade shows and exhibitions geared toward the Macintosh buyer appears to be diluting the popularity and influence of these shows, although their sponsors say they're unfazed.

In addition to last week's Macdex show in Chicago, April offers this week's Macintosh Business Conference in New York as well as the new Macworld Expo April 25 through 28 in Washington.

To Macintosh vendors, the choices are dizzying, and the costs of exhibiting at multiple shows are becoming prohibitive.

The low attendance at the Macdex show here probably would have discouraged most convention promoters, but the Interface Group's CEO Sheldon Adelson said he has no plans to stop. "People say Comdex is too big, so we're doing something about it," Adelson said. "People want some product verticalization." Adelson said he plans to go ahead with plans for fall Macdex to be held alongside Comdex in Las Vegas.

This year's Macdex, held in conjunction with spring Comdex, drew only about 30 exhibitors. Adelson said the vendor response was poor because the Interface Group announced plans for the show after most companies had made their plans for attending Comdex as well as Apple's decision to stay away.



A major stumbling block facing the Macdex show is that Mac software vendors, such as Microsoft and Aldus, are already Comdex exhibitors and are not interested in manning two booths.

Mitch Hall, sponsor of the Macworld expo, said he expects a shakeout among the Mac trade shows. "I don't believe Mac Business Conference or Macdex have affected or will affect our business," Hall said. "But I don't feel there's a need for so many shows." Hall expects 250 companies in 600 booths next week's Macworld.

John Zeisler, vice president of marketing for Claris Corp., which was not an exhibitor, said that four years ago, it might have been a good idea to isolate the Macintosh at Comdex and show it off. However, he said, "if you talk to the vendors here, they'll tell you they do much better in Mac-only shows."

BSA Files Copyright Infringement Suits Against 3 Italian Companies

BY MARK BROWNSTEIN

The Business Software Association (BSA), a small group dedicated to fighting software piracy, recently announced it had filed copyright infringement suits in Milan, Italy, against several major Italian corporations.

In a prepared statement, the BSA said it has charged Electrocarbonium S.p.A., Montedison S.p.A., and its Montefibre affiliate with "extensive unauthorized copying of software from BSA members Ashton-Tate and Lotus Development."

Court-ordered inspections at Montefibre revealed that more than 90 percent of the inspected software on the premises was unauthorized copies of the BSA said. At Electrocarbonium, 80 percent of the software found was unauthorized copies.

BSA officials said they hoped

the suits would send a message to other companies that are pirating software.

"Henceforth, organizational users of personal computers in Italy need to recognize that unauthorized internal reproduction of software carries very serious risks," said Douglas E. Phillips, president of the association. Although he did not name specific companies, Phillips also said the BSA will take action against other organizations.

The BSA was formed last year by representatives from Ashton-Tate, Lotus Corp., Aldus Corp., Autodesk Inc., Microsoft Corp., and Word Perfect Corp., with the purpose of finding and prosecuting software pirates overseas.

Sources in the United States said that the BSA is also looking for similar copyright violators domestically.

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Symantec
- 5 **Base for DOS 2.1**
Microm
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- 8 **Reflex**
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Patton
- 6 **Designer 1.3**
Micrograf
- 7 **GEM/3 Draw Plus 2.0**
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Many "so-called" hard disk subsystems are no more than a collection of third party components casually thrown together—the "drive du jour," miscellaneous software patches and an assortment of hardware.

What appears to be lower cost initially can end up being a lot more trouble—and money—than you bargained for. Like the frustrations of getting the system up and running. The expense of system downtime. And, the cost and time of recycling products that just don't work right.

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your valuable data (or your business) to a bare drive boxed up with a bunch of spare parts. Parts untested with each other, much less in your application environment.

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STATE OF THE INDUSTRY • By Rachel Parker

i486 Shows How Hardware and Software Makers Are Out of Step



Intel Corp.'s recent chip announcements suggest that we are on the brink of a new era of computer technology, but the latest technical achievements won't be seen in the market for quite some time.

At Comdex last week, Intel showed off the latest of its family of microprocessors: the long-awaited i486. By Intel's measure, the i486 is two to three times faster than the 80386 and packs the functions of several chips in one. With this power and speed, the i486 promises to be the core of more powerful, graphical, and flexible desktop computers.

These are all great innovations and improvements within a compatible structure. When combined with the i860, the i486 can truly bring mainframe-type processing to a desktop computer, enabling PC users to perform calculations and graphic simulations that have been possible only on scientific workstations.

So, why is there a lack of genuine enthusiasm for the i486 in the industry? Perhaps because the chip represents a future technology, and right now the industry is full of future and not enough present technologies.

Like any new chip, the i486 will take some time to be implemented in products we can attach a keyboard to and use. Last week's demonstration was done with prototypes and samples. Full production versions won't be available until the fourth quarter.

Rumors have it that there is a race among the hardware vendors to be the first to announce an i486 system. Compaq Computer Corp. has carved a reputation for itself by being the first with a 80386 system. Many naysayers believed Compaq took a glacial risk by introducing the system, given that the benefits of the expensive machine were limited to speed. Apparently, Compaq's gamble paid off quite handsomely. Now, the newly invigorated IBM Corp. wants to take on the role of technical leader.

In any case, the first systems probably won't be here until Christmas. While they'll make one wonderful Christmas present, you can bet they'll be pricey as well.

More distressing though, is the way that hardware innovation keeps moving ahead of software. True, the i486 systems that are developed will be capable of running DOS and OS/2 software. Intel's strategy of binary compatibility makes the systems, at least, useful for the large installed base of DOS users. Lotus 1-2-3 users with gargantuan spreadsheets will be capable of running their DOS or OS/2 applications with the i486 — just faster.

But it will be quite some time before an operating system for the i486 is developed and available to programmers. There will be an endless road of waiting for publishers to see how many corporate buyers will jump into the i486 market, how many will tolerate software upgrade issues, and whether the market has enough memory to support the new,

more robust applications.

Sounds familiar, huh? When the 80386 chip and Compaq's first system were considered technological improvements, there wasn't much in the way of software that took advantage of the new hardware platforms. For that matter, there still isn't much in the way of software that takes advantage of the 386's virtual memory mode.

Mainstream development efforts are even further behind. The OS/2, with Presentation Manager that developers are working with today exploits all the features of the 80286, a chip that was introduced more than four years ago. Microsoft Corp. and IBM have said that an 80386 version of OS/2 will come, but left still unanswered the questions like when, what will it do differently, and are there going to be new software incompatibilities to worry about?

The real problem is that the hardware and software communities are profoundly out of step. By the time the 80386 version of OS/2 is developed, the applications that exploit it and the 80386 chip are available, Intel may be up to the 80786 or the 80886. And only Intel's engineers could tell you what those products may feature in terms of speed and power achievements.

Hardware innovations must also deal with software that moves slowly at the end-user level. The OS/2 that is shipping today has fallen far short of sweeping the nation. Developers are waiting for tools and customers, and customers are waiting for a catalyst application — one that will make them want to jump ship and try something new. The success of the old processor and old operating system are making it harder and harder for a new product to create the same kind of market impression its predecessor did.

None of this is revolutionary; it's evolutionary instead. The entire computer industry has become so layered, so dependent on other factions moving in proper synchrony that it has become difficult for radical new technology to make an immediate splash.

Of course, some systems manufacturers are taking an immediate, and some customers — the same type who bought the first 80386 systems — will race out to buy an i486 system as soon as it is available. The systems will carry a steep price tag and will help keep hardware makers' margins high.

But the i486 will not be fully exploited until the software community makes the computer's language. The increased power and a matched set of software will also become much more active parts of our lives, automatically taking care of such tasks as tracking interest rates.

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Rachel Parker is senior editor of InfoWorld's industry section.

TECH STREET • By John Gantz

High Costs of Conversion May Hamper Acceptance of Unix OS



In case you hadn't noticed, market research companies are calling for a major growth in the market for the Unix operating system (although they aren't generally telling you which of the many flavors of

Unix will prevail). For instance, International Data Corp. says shipments of Unix systems (hardware and software) last year were 9 percent of a worldwide total of \$121 billion. By 1993, says the firm, Unix will account for 19 percent of the market — which will presumably be in the vicinity of \$150 billion or more by then. So, hey, the Unix star is on the rise. But I bet it's going to be harder to hitch a wagon to that star than many people realize.

The reason: Most PC users have never changed operating systems. Based on demographics, the odds are good that most likely have gone from CP/M for 8-bit computers to MS-DOS for 16-bit computers or from MS-DOS to the Macintosh. As a result, I'd have to predict that the pain of operating system conversion is universally underestimated — perhaps by orders of magnitude. And in the case of Unix, the pain is even more. MS-DOS or OS/2, the pain will be compounded by the fact that operating system complexity more than doubles. We're not just migrating from one PC operating system to another: We're entering a whole new realm when we get into Unix.

Old-time Unix converts. Mainframe computer sites used to (and probably still do) spend months planning a major operating system conversion, and even then it was always a chore. Applications had to be rewritten, bugs ironed out, and current jobs executed all at the same time. One of my jobs at IDC was to conduct brand name loyalty studies, which invariably showed that users swapped CPU vendors less than one time in nine upgrades. Other research indicated why: It was too hard to convert to new operating systems. And almost all successful conversions of installed base had to be accompanied by major assistance in converting applications from one operating system to another.

If you think I'm exaggerating, take a look at your March issue of *PC Report*, the newsletter of the IBM PC user group of the Boston Computer Society. On page 27 there is an eye-opening article by David S. Reinhardt entitled "Making the Unix Migration."

If you read the article to the end, you'll learn that Reinhardt is more or less an advocate for making the switch. His company, which appears to sell software or systems, went from single-user 286-based PCs to a multiuser 386-based PC running a variant of Unix. What also becomes apparent is that Reinhardt is more than your average power PC user. He spent, after all, a week in Unix training.

But even at the time, Reinhardt's company went through to migrate from MS-DOS to Unix. The company:

• Made the decision to switch — perceiving that its major customer, the federal government, would see Unix

operating system in its favor.

• Evaluated products and picked SCO Xenix — a mature product.

• Bought the 386 platforms and chose the Dell 310 — balancing availability with price.

• Chose add-ons: VGA video, 60-megabyte tape backup, micro coprocessor, 4 megabytes of RAM, multipoint serial boards, and various Xenix packages.

• Received its first computer two months later.

• Failed in its first attempt to boot Xenix — a newer version of Xenix ordered and shipped Federal Express.

• Sent Reinhardt cross-country for one week of Xenix school.

• Booted Xenix and made DOS partitions — tape drive and controller didn't work. Needed tech support help to fix.

• Discovered only one of two multipoint boards would work without a vendor rewrite of board drivers — did without.

• Discovered failure of normal COM port on the motherboard — got fixed under warranty.

• Had to disable "fast BIOS" and "fast video" to get boards to work.

• Found initial version of VP/ix (DOS under Xenix utility) didn't work — upgraded to a newer version with help from SCO's technical support.

• Installed new VP/ix, which works with some limitations because of board drivers.

• Installed users and set up file permissions, discovering a "Typhoid Mary" whose ID always caused a disk crash. Renamed ID.

• Discovered a bug in converting DBase files to run under Xenix, and had to add code to all DBase programs.

• Discovered SCO Professional, a Lotus clone, wouldn't read some other files that Lotus 1-2-3 would.

• Discovered C. Itoh laser printer emulation of HP Laserjet required some unique settings to work.

At the time of writing, Reinhardt's company was really just getting into true multiuser mode — and just beginning to see a payoff from the conversion in terms of backup, per-user costs, and overall system performance.

But here's a company that's already quite technologically savvy, going through all this conversion effort. What about your company and mine? Do we have the time to send system administrators to Unix school? Do we even have a systems administrator identified? Are we going to repeat mainframe history and go through a costly conversion and still find ourselves running our old programs in emulation mode?

I dunno. I'd like to believe the market forecasters are right, since bullish forecasts are more fun when they're fulfilled. But I've seen more than enough bullish forecasts go by the wayside over the years — and more times than not the culprit was the user who couldn't face the burden of switching to the new technology. Conversion costs were too high.

John Gantz is editor of the Tech Street Journal, a newsletter on the high-tech stock market and business performance. The views expressed are his own.

PERSPECTIVES

Faster than Word Perfect 5.0...

More powerful than a Lotus spreadsheet...

Able to leap tall Dbase files in a single bound...

It's...

SUPER TEMP!

BY ALICE LAPLANTE

Picture this scenario: A key administrative aide in your company comes down with a severe bout of the flu. Unfortunately, he is in the middle of preparing a critical report for the marketing department—a task requiring both a general knowledge of basic Word Perfect functions and an intimate understanding of the more sophisticated desktop publishing features of Version 5.0.

Although the aide's files are intact and logically named, the department head realizes he doesn't have anyone on staff proficient enough with the desktop publishing aspects of 5.0 to finish the report in time to present a slick, finished product to the board of directors.

In the past, the manager would have had little choice but to blow her deadline. Now, however, she has another option: hiring a computer-savvy temporary to finish the job on time.

Such temporary agencies as Kelly Services, Adia, and Manpower now offer temp workers who are trained and experienced in leading business programs like Word Perfect and technical specialties like desktop publishing.

Gone are the days when all a temp could be expected to do was a little typing and a little filing. Many PC software packages—such as Word Perfect, Microsoft Word, and Lotus 1-2-3—have been around long enough to allow temp agencies to build up large pools of capable PC workers, thus making it easy for corporations that depend on PCs for much of their day-to-day work to replace an absent employee for a day, a week, a month, or longer.

"It used to be a real problem finding temporary replacements who knew enough about PCs to be of any real use," said Jim Dalton, the MIS manager at a large Midwestern financial institution. "For a long time we were resigned to expecting little productivity gains from hiring a temp from an agency."

This has changed, Dalton said. It's not unusual now to see temp workers with much more sophisticated PC skills—particularly in the word processing area—than even permanent employees, he said.

However, Dalton and others PC managers warn that there are risks involved in hiring temp workers with supposed PC skills. For example, how well has the temp agency done its job in screening,

interviewing, testing, and training its temporary workers before sending them out on assignment? What happens if an on-site temp can't figure out a particular corporation's computing environment? If the temp alters or deletes essential data files? Or if the temp needs continual help with basic PC functions?

Every problem and issue faced by a corporate PC manager in training and supporting permanent end-users is complicated manifold once temporary end-users enter the picture.

"I've had mostly bad experiences with temps because they are mostly brought in to handle urgent projects and are expected to become productive immediately, yet don't know the software packages we

are using," said Phillip Gordon, PC manager at Charles Schwab & Co. Inc., in San Francisco. "Too many people aren't realistic. They think a PC is like a typewriter, and that someone can come in and master it in five minutes. That just isn't the case."

Because corporate PC professionals are so significantly affected by the quality of the temporary workers hired, they should become at least peripherally involved in the selection process, even if this means sharing duties normally performed by human resource departments.

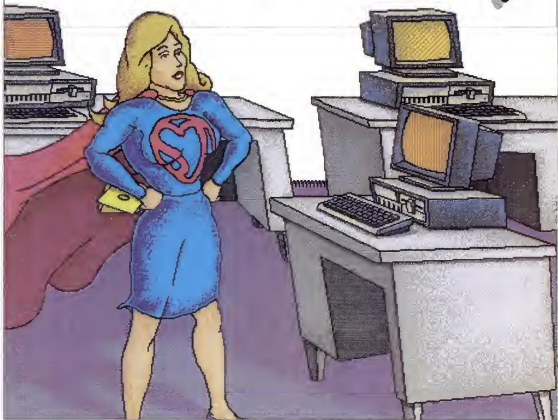
"I'm the one that gets the frantic call when the temp can't figure out what to do," said Schwab's Gordon.

In this article, *InfoWorld* looks at the

various screening, evaluating, and training procedures used by the major temporary agencies and, more importantly, how temps are supported when they run into problems on the job.

PCs REDEFINE TEMP INDUSTRY. Until the late 1970s, the temporary business was booming, and most of the office skills in demand were uncomplicated and straightforward: fast and accurate typing skills, correspondence- and memo-filing experience, spelling and grammatical acumen, and other routine clerical tasks such as taking dictation and answering phones.

These were such basic functions that whenever a temporary agency perceived



an increase in demand, it would simply put ads in local newspapers and/or raise its pay rates, and supply was easily brought up to meet demand.

But the dedicated word processor began to change all of that in the late 1970s and early 1980s. "We tried to do business the exact same way we'd always done," said April Porvin, national office automation manager for Kelly Services Inc., in Troy, Michigan, which was founded in 1946. "We always recruited temporary workers in exact proportion to the requests we were getting from clients by putting ads in newspapers, interviewing everyone who came in, and evaluating typing skills, spelling skills, and so forth." But what happened in 1981 was unprecedented, Porvin said. Suddenly, Kelly started getting a lot of orders for dedicated word processor operators who knew how to operate Wang, IBM, and NCR systems.

"At first we tried to run the business the same way," Porvin said. "We put ads in the major papers and waited for applicants to come in. Nothing happened. We put bigger ads in the papers and increased our pay rates—all the typical things we do when for some reason it's tough to recruit people. Still nothing happened."

The supply of experienced word processor operators simply didn't meet demand, a situation that began to seriously snowball in late 1982 and 1983.

Kelly realized it had to implement an aggressive recruitment, evaluation, and training strategy, which meant essentially rethinking everything about the way it did business.

At Olsten Corp., a Westbury, New York-based temp agency, the same series of events occurred, leading that company to establish 35 Wang word processing training schools in the early 1980s to deal with the huge demand for dedicated Wang word processor operators. It wasn't long before they implemented similar programs for Lanier, CPT, Xerox, and IBM systems, then moved on to doing the same for the new PC-based word processing applications.

Olsten found itself faced with a situation where not only were its clients looking for temps to do PC-based word processing but the clients themselves were only just learning PC skills, and there obviously wasn't a pool of experienced temps the agency could draw from, according to Bob Lyons, assistant vice president of office automation at Olsten.

SUPPORT WOES. PC managers don't always

have the time or resources to support temporary workers, and often that task is taken up by the temp agencies themselves. In fact, figuring out how to provide immediate help to thousands of temporaries placed in corporations throughout the country continues to be the toughest challenge facing temp agencies.

"I basically run the biggest information center in the world," said Kelly Services' Porvin.

Temporary agencies interviewed by *InfoWorld* pointed out the following difficulties they face with each temp placement:

- No control over hardware configurations.
- No control over the version of the software being used.
- No control over passwords or other security measures.
- Few or no instructions—written or otherwise—on how a particular office uses PCs.

Many temp agencies have learned to make contact with PC or MIS managers—and not just personnel or human resources departments—in client companies whenever possible to eliminate potential mistakes or misunderstandings.

"Many of our sales calls on clients actually are made to MIS departments," said Porvin, who added that Kelly representatives are sensitive to the requests and suggestions of systems professionals. "For example, they [MIS managers] are always happy to hear we have a [toll-free] support hot line, since most of the problems arise from the fact that some temp services don't test sufficiently and assign people who aren't skilled, and the burden is being picked up by the information center manager."

STANDARDS: ANOTHER BURNING ISSUE. Due to the limited number of temp agencies, many can afford to train their workers in more than a handful of software and hardware products. At Olsten, five PC software packages are supported: Multimate, Word Perfect, Wordstar, Displaywrite, and Lotus 1-2-3.

"These five cover about 90 percent of the requests we get from clients," Lyons said.

Other temp agencies support even more applications, however. For example, Snelling & Snelling, a temp agency based in Sarasota, Florida, supports nine, and Kelly Services supports 16. (See related story, Page 46.)

Although most temp agencies are constrained in how many applications

Help Wanted: Highly Technical Temporaries to Support PC Users

No longer do temporary workers merely pinch-hit for clerical personnel. Increasingly, more specialized workers such as accountants, nurses, and engineers are available for short-term stints.

Most notably for *InfoWorld* readers, there is an increasing demand for temporary programmers, systems engineers, and application developers who have heavy PC experience. Now, temporary agencies specializing in placing highly technical personnel see the demand increasing for technical workers to help support PCs through an information center or end-user computing department.

"Historically, there hasn't been a lot of demand for temporary workers with a lot of PC experience," said Tony Vickers, president and CEO of Computer People Inc., in Los Angeles, which specializes in placing computer professionals in temporary employment situations. "But in the past 12 months, there has been a trend toward a demand for PC programmers, particularly in the manufacturing sector," Vickers added.

Corporations generally use PC consultants for three or four months, as opposed to mainframe sites, which hire temps for longer-term projects of six to 12 months, Vickers said, adding that although it

varies depending on experience, temporary PC consultants get between \$35 and \$55 per hour.

One of the reasons that more corporations are looking to temp agencies to provide them with skilled computer professionals is that finding permanent employees with experience and expertise is very difficult in the current market, Vickers said.

There are a lot of recent college graduates with computer science degrees entering the work force, he said, but they lack the know-how that more experienced computer people have.

"We can provide people who are productive quite rapidly and where they were side by side, more entry-level staff," Vickers said. "So the less-experienced workers get on-the-job training as a legacy from our temporary but more knowledgeable staff."

Computer People has 18 offices overseas, 18 in the United States, and over 100 consultants on assignment at any given time.

"We're only just beginning to see the emergence of the PC in the workplace," Vickers said. "MIS departments have traditionally centered around the mainframe and saw the PC as an erosion of their power. Now they see the other side of it."

they can support on a national basis, most said that their local offices can handle special requests. For example, if a client in Chicago needs a temp well-versed in Supercalc, the agency can actually go out, buy the software, and train a temp on it to fulfill the client request.

One problem with this approach is that companies don't always use the latest version of leading business applications. For example, many corporations still use Release II or Release III when Supercalc IV is now shipping, and temp agencies must be prepared to handle both present and past versions of popular software packages.

"One of the most difficult aspects of our industry is that we have to react to whatever clients ask for," said Olsten's Lyons. "For example, some corporations have upgraded to Word Perfect 5.0, but we are also faced with clients who still use 4.2, so we have to service both."

EVALUATING PC SKILLS. The way in which an agency evaluates the PC skills of potential temps is probably the key to separating a good temp agency from a mediocre one. Unfortunately, it's very difficult to judge beforehand whether the agency is doing adequate screening.

The procedure involved is fairly standard across most agencies: Applicants come in for an assessment or getting a referral, and their PC skills are evaluated through some combination of written, oral, and hands-on tests. Depending on the results of the test, any hopeful is ranked on a "competence scale," which varies from company to company. Some have only three basic grades such as basic, intermediate, and advanced. Others can have as many as seven or eight different grades, and still others have more. Snelling & Snelling has 23 different skill levels.

"Unlike many other firms, we go into greater depth on how many levels of expertise we are testing," said Brian G.

Dailey, senior vice president of franchise support for Snelling.

At Olsten, potential PC operators are given two separate tests: a hands-on skill test where the applicant is actually using the software in question and a written test that shows their overall knowledge of what the software can do, testing to see if the applicant knows the most efficient way to perform key functions using the software.

For example, in an Olsten hands-on test, applicants are asked to move a block of text or delete a paragraph, while in the written efficiency test, they are asked general questions pertaining to creating a new Lotus spreadsheet.

"When done with the evaluation, we get a score sheet printed that lists all the functional areas and tells us whether that person has basic, intermediate, or advanced knowledge of each area," said Olsten's Lyons, who added that at his agency, scores are tabulated on a percentage basis.

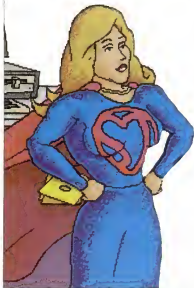
For example, an applicant might have scored 100 percent on a basic skills test but only 25 percent on the advanced skills, Lyons said.

"So, we know precisely which features of the software they know and don't know and exactly what skill level they are at," Lyons said. "Then, if we get a request from a client for a word processor, someone who scored 100 percent on the basic skills test would be a good match. But if a client is looking for someone with more advanced skills, having only 25 percent of those skills would not be a good match."

TRAINING PROBLEM AREAS. Due to the overwhelming demand for PC temps, even if an applicant has shown a weakness in one or more areas, most temp agencies will put that person through a formal training program, usually at no cost to the applicant.

Temp services interviewed by *Info-*

"Most agencies can handle special requests. For example, if a client in Chicago needs a temp well-versed in Supercalc, most agencies will actually go out and buy the software and train a temp on it to fulfill the client request."



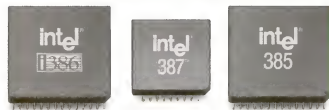
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World stressed that once temps have a certain amount of PC knowledge, they can be easily cross-trained to learn other packages as well. For example, a Word Perfect expert could very quickly pick up the essentials of Microsoft Word or Wordstar, and someone familiar with Lotus could be trained quickly to use Excel or Quattro.

Most temp services actually have training courses developed in-house to fit their specific needs. Others use outside training vendors to teach potential operators. And still others put the cost of training onto the applicants themselves.

Milwaukee-based Manpower has developed a diskette-based training program, called Skillware, which has become so highly regarded outside of the agency that IBM chose to use Manpower training materials to teach its salespeople more about the computer products they were selling. Other vendors and local businesses have also started using Manpower's training capabilities, which have turned out to be an additional source of income for the agency.

Although training potential temps—using both classroom and self-paced methods—is time-intensive and expensive, demand for PC-literate temps is so high that it's worth the cost, said Laurie Andersen, an information specialist at Manpower.

QUICK-REFERENCE GUIDES. After the testing and the training have been completed, it is still unreasonable to expect that a temp on assignment could know by heart all the commands or functions of a software application. So all temp services provide operators quick-reference guides, which are small books, easy to carry in a briefcase or purse, that summarize keystrokes and functions in an easy-to-digest (usually alphabetical) manner.

Although some of these reference guides are developed in-house by temp firms, others are actually written and produced by well-known vendors. PC managers can also buy such guides off the shelf for their own end-users.

OTHER KINDS OF SUPPORT. But if all the

other factors are relatively equal, on-site support of temps is what really separates one agency from another.

By far the most sophisticated support is provided by Kelly Services. In addition to the standard testing and training that other services provide, Kelly has an 800 hot-line number open from 8:30 a.m. to 8:00 p.m. Eastern time.

Kelly's support hot line is based in Detroit and staffed with office automation "experts" who answer calls from the United States, Canada, and Puerto Rico, according to Porvin, who said that callers have a wide range of questions.

"We have over 170,000 temps out there using our services," Porvin said, "so our support staff has the actual software running in front of them all the time, so they can walk temps through the software step by step."

Porvin is adamant about the need for such a hot line. "We don't say," Call Hewlett-Packard or Word Perfect," she said. "We take responsibility for supporting our workers."

Other temp agencies refer questions from temps in the field to designated "experts" who are part of the staff at local offices. For example, Olsen has hired "office automation specialists" in all major metropolitan areas. "This is the person who does all the local placing of temps and also coordinates all the in-house training," Lyons said. "That person represents the first level of resource for our temps. If that isn't sufficient, we have around the country designated office automation 'coordinators,' people with a higher level of office automation expertise, who are in place to help the local specialists."

Finally, Olsen headquarters there are technical staff members to help the coordinators—who subsequently pass on answers to local "specialists," Lyons said.

Other agencies maintain that often the best source of accurate and relevant support is the client company itself. For example, at Snelling & Snelling, temps are encouraged to ask any questions they might have at the actual site before seeking support from Snelling staff.

"We recommend that our temps speak to their on-site supervisor at the client company," said Snelling's Dailey, who said that they consider that better than attempting to contact the hardware or software vendor directly.

CHOOSING THE RIGHT TEMP SERVICE. Because of all the variables involved, PC coordinators should work with their human resource departments to ensure that any temporary workers hired have been carefully screened and trained.

"Often the problem is not with the temp agency but with the client company that requests the temp," said Schwab's Gordon. "They aren't specific enough about what they need. For example, they say they want someone with Multimate experience, but they don't specify that they need the advanced mail-merge capabilities of that package."

Here are some recommendations for PC managers on how to avoid last-minute panic calls:

- Communicate exactly what PC skills are needed for any given temp position that comes up. Specifying the exact

version of a particular software package—Word Perfect 4.2, for example—was as well as whether the temp needs to have basic, intermediary, or advanced skills in that package is essential.

- Check with temp agency's screening, training, and support policies. If possible, review their testing procedures and make sure you have a clear understanding of who the temp can call if he or she runs into any problems while on the job.

- Make sure your firm's PC environment—as standard and well-defined as possible. In those jobs where temps are likely to be used—secretarial positions, typing pools, administrative assistant openings, etc.—make sure that everything is either written down or clearly understood by permanent employees.

- Finally, expect that any of the problems you face in top-quality permanent end-users will be complicated tenfold when temps are used—and plan accordingly. If permanent employees tend to have problems understanding how a particular software package works, chances are a temp will run into the same problems.

A Guide to Temporary Employee Agencies

The following is a list of several major nationwide temporary employment services, including a brief description of the company and the software packages it supports.

Kelly Services Inc.

Troy, MI
(313) 362-4444
Kelly started training temps on dedicated word processors in 1983; in 1985, they initiated formal training on PCs. Also in 1985, the firm established its toll-free hot line for all Kelly temps working in the continental United States, Canada, and Puerto Rico.

Also in 1985, the firm established its toll-free hot line for all Kelly temps working in the continental United States, Canada, and Puerto Rico. Also in 1985, the firm established its toll-free hot line for all Kelly temps working in the continental United States, Canada, and Puerto Rico.

Manpower

Milwaukee
(414) 961-1000
Manpower is also known for its PC training, both on-site and off-site, having formal training agreements with IBM as well as other vendors and U.S. businesses. In the early 1980s Manpower developed its "Skillware" hands-on training courses for all types of computers and dedicated word processors. Training for applicants is free.

Although it doesn't have a toll-free support hot line, Manpower does offer local support at each temporary's home office.

Manpower supports Word Perfect, Wordstar, Multimate, Microsoft Word, Samna, Displaywrite, Officewriter, Lotus 1-2-3, and Obsidian. Support for Macintosh software will be announced within the next quarter.

The Olsen Corp.

Westbury, NY
(516) 852-8200
Although it doesn't have a toll-free support hot line, Olsen offers three levels of support: At each branch there is an office automation specialist; for

each region there is an office automation coordinator; and if that fails, there are technical support personnel at national headquarters.

Training is free for applicants. Olsen supports Word Perfect, Wordstar, Displaywrite, Multimate, and Lotus 1-2-3.

Adia Services Inc.

Mentlo Park, CA
(415) 324-0696
Founded in Lausanne, Switzerland, in 1957, Adia entered the U.S. market in 1972. It now has over 520 offices in 39 states and focuses on a number of niche markets through a series of acquisitions in areas such as accounting, word processing, financial services, and health care.

Adia goes about recruiting and training PC temporaries in a different way than other temp agencies. There is no in-house training or support; instead, Adia puts ads in local newspapers and screens applicants; applicants without the necessary skills can be placed in local training classes sponsored by trade schools, PC dealerships, or junior colleges; however, the temps themselves must pay for the training. When a temp completes 150 hours of work for an Adia client, he or she gets reimbursed for half of the price of the course, up to \$100.

Snelling & Snelling

Sarasota, FL
(813) 922-9616
Snelling uses a standardized testing system made available to all franchisees, called Snelling Temporaries' Evaluation Program (STEP) that determines which one of 23 different skill levels a potential temp has. Then, if necessary, applicants can take skill enhancement programs, each of which takes approximately four hours.

Snelling has no hot line or national support but provides temporaries with quick-reference guides for on-the-job questions.

Training is free for applicants. Snelling supports Displaywrite, Multimate, Wang, Volkswriter, Lotus 1-2-3, Word Perfect, Microsoft Word, Wordstar, and Samna.

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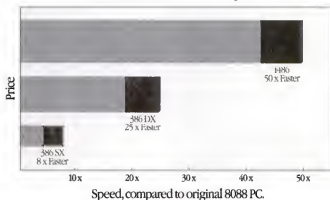
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ERIC HAPPAU

Publisher



THE EDITOR

Byline's Benefits

Regarding Michael Miller's First Look column of March 27 (Page 58), if the only thing Byline did was publish attractive material, reading DBF and WKS files without the need for file translation, then it would stand head and shoulders above PageMaker and Ventura for database and spreadsheet users. Fortunately, it does this and more.

As the author of Byline Business Applications, a book and software combination that includes more than 30 templates of database and spreadsheet publishing, I can attest that a good desktop publisher need not mimic PageMaker or Ventura, as Miller infers in his column. I publish all my newsletters and press releases and marketing materials with Byline. Most people are surprised that I did not use a Macintosh, Excel, PM, or Ventura to achieve the same high level of output.

Daniel Janal
Janal Communications
Fort Lee, NJ

Generic Profits

This letter is in reference to the item on Page 6 of your March 13 issue, "Autodesk Buys Out Low-End CAD Leader Generic Software."

While we were very pleased to see the headline and like the article, the second-to-last paragraph, referring to "industry sources," left us somewhat miffed. It stated that "the company had never been profitable, according to sources."

The company achieved a break-even state in fiscal year 1986, and was profitable in fiscal years 1987 and 1988, reporting a respectable taxable income to the IRS. But the real test was starting the company on virtually no capital and without outside private investors or venture capital, and then bootstrapping it through three years and an annual doubling of sales with the company's

internally generated profits.

Generic did not even have a line of credit until the fall of 1987, two years after the company was founded.

Robert A. Fulton
President
Generic Software
Bothell, WA

Inappropriate Hype

After reading George Morrow's column (April 3, Page 54) on the coming of color laptop screens, I see we are going to go through another wave of inappropriate technology hype. There is nothing wrong with color displays in themselves, but they should not be the system interface of choice for most users.

Despite the impression created in articles and advertisements in the computer press, few applications programs really justify color.

The vast majority of users spend most, if not all, of their time using word processing, spreadsheet, and database applications. Despite the high-resolution pixel counts for color VGA, for example, text and numbers are crisper and sharper on monochrome displays. My VGA monochrome setup is definitely cleaner than when the same card was hooked up to a well-respected multisync color monitor.

The alignment of the red, blue, and green matrix in a color monitor is never as good as the single color (amber, green, or white) of a monochrome monitor, whether it supports MDPA or VGA standards.

Being capable of displaying color on a laptop is hardly a priority on the list of important functions most users want to see. Lower weight, more computing time per battery charge, and increased memory make sense. System interface technology should be appropriate for the application, a message that gets lost in the hype.

Edward Bauman
San Diego

Diskless Workstation Costs

Jeff Angus' arguments about diskless workstations (March 27, Page 52) have some major flaws. An additional \$100 for a floppy drive will not convert a dependent diskless PC into a stand-alone system.

I know of few software packages that will run on a machine with a single floppy disk drive. In fact, most current packages do not run effectively without a hard disk.

Try using a good spreadsheet or word processor on a single/floppy system. A more accurate assessment of the cost of upgrading is \$600 to \$1,600 or more. This should cover the costs of a floppy drive (\$100), a hard disk (\$500), and any necessary software that would not be available without a server. I agree that floppy drives are a good investment. Files which need not be shared can, and often should, be stored off-line and managed by their authors. I also agree that a deliberate campaign against games and other software deemed non-productive by managers is pointless.

Oren J. Camber
Office Automation Design
Miami Springs, FL

Corrections

In the April 10 First Look column (Page 56), we gave the wrong phone number for Video Maker Systems of Santa Cruz, California. The correct number is (408) 429-8332.

In the Page 1 chart "33-MHz 80386 PCs Burn Rubbed at Comdex," the price of the Legend 33 (\$8,595) includes a 300-megabyte ESDI hard drive.

Please write to Letters, InfoWorld, 1060 Marsh Road, Suite C-200, Menlo Park, CA 94025 (MCI Mail: 259-4127; Computerworld: 73267/1537; or The Source: TCS99). Include your name, address, and daytime telephone number. Letters selected for publication will be edited for length and clarity.

Exposition Group, (203) 352-8225.

May 31-June 1, Santa Clara, CA: Portable Computing '89 will offer a series of events presenting product and services exhibits and offering in-depth tutorials and application seminars. For further information, call (800) 225-4698.

June 20-22, New York: PC Expo seminar series features offers over 40 sessions. Location: Jacob K. Javits Convention Center. Contact: H. A. Bruno Inc., (201) 569-8542, (800) 444-EXPO.

June 20-22, Chicago: The Network Management Solutions '89 conference will focus on management solutions to increase productivity and efficiency. Contact: (800) 225-4698, (508) 879-6700.

InfoWorld welcomes notices of national conferences, trade shows, and meeting schedules of professional data processing, MIS, information center, and microcomputer management associations or support groups. Send notices to Resources, InfoWorld, 1060 Marsh Road, Suite C-200, Menlo Park, CA 94025. No local training or education seminars, please.

RESOURCES

April 24-26, San Francisco: "Moving to Database IV" is a three-day seminar by Adam Green for experienced Database users to learn features of Database IV with little repetition of Database III and III Plus. He will also hold a two-day "Advanced Database IV Topics" seminar on April 27-28. Location: Hotel Nikko, Contact: Digital Consulting Inc., (508) 475-6990.

April 25-27, Atlanta: The Citex (Computer Industry Trade and Exposition) show features exhibits by manufacturers and industry-specific conferences. Washington E. Daniels of BellSouth Services and Will Keiper of Microgame Computer Stores will deliver the keynote speeches. Location: Georgia World Congress Center. Contact: H. A. Bruno Inc., 385 Sylvan Ave., Englewood Cliffs, NJ 07632; (201) 569-8542, (800) 444-EXPO.

April 26-28, Washington: The First Macworld Exposition in Washington will offer conferences and workshops involving Mac hardware, software, peripherals, and services, along with a special government-user session. Location: D.C. Convention Center. Contact: Diana McGowan, Mitch Hall Associates, P.O. Box 155, 1200 East St., Westwood, MA

02090; (617) 329-7466.

May 9-11, New York: The National Financial Computer and Automation Conference covers the computer needs of financial industries such as banking, financial services, and insurance companies, and financial consultants and resellers. Location: Jacob K. Javits Convention Center. Contact: H. A. Bruno Inc., 385 Sylvan Ave., Englewood Cliffs, NJ 07632; (201) 569-8542, (800) 444-EXPO.

May 14-17, San Diego: Adapo, the Computer Software and Services Industry Association, is holding a 2½-day management conference. AT&T CEO Robert Allen, Sun CEO Scott McNealy, and Ashton-Tate's Luther Nussbaum will give keynote speeches. Location: San Diego Marriott Hotel & Marina. Registration: \$625 for Adapo members, \$825 for nonmembers. Call: (703) 522-0505.

May 16-18, Chicago: The Corporate Electronic Publishing Systems (CEPS) show and conference features more than 60 speakers on subjects from desktop publishing to open architecture and systems integration. Location: McCormick Place. Contact: Kimberly Ray, Cahners

PC Magazine, Jan. 31, 1989, awarded Northgate's 286/12SM system its highly respected...

**EDITOR'S
CHOICE**



PC Magazine said:

"Speed by design: it's clear that Northgate Computer Systems values quality for the dollar with an emphasis on speed. The hardware and software components used in the Northgate 286/12 are chosen to give the most pep for the fewest dollars.

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THEN PC MAGAZINE CONCLUDED:

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That's the BEST reason Northgate's 286/12SM complete system deserves Your Choice as your next computer!

Unpack the carton, plug it together. Turn it on. The already formatted hard drive purred. Up pops the C> prompt. Type DIR. **Zip**. Files fly by so fast you have to freeze the screen to read them.

Then you notice...68 megs or more of RLL hard disk storage. No partitions either. Northgate gives you MS-DOS 4.01 with this system. Most others don't even include DOS. They charge extra. Including Dell.

Now...take it for a test drive. Load your programs. Finished so fast? Run 1-2-3. Try a re-calc. You hardly get your finger off the Enter key before it's done. *You don't know what fast is 'til you've run this baby.*

And the 286/12SM exudes quality. No cheap, old fashioned 12" monitor. Here's a high quality 14" graphics monitor, or even better, a true 16-bit (not 8-bit) VGA graphics monitor puts 256 colors on the screen. *Simply magnificent.*

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No light weight this... full expansion capabilities, features and performance no other complete system can offer at the price



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EDITOR'S CHOICE
FACT FILE

Northgate 286/12
 Northgate Computer Systems
 13895 Industrial Park Blvd., #10
 Plymouth, MN 55441
 (800) 548-1993
 (612) 553-0111

List Price: With 1MB RAM, 67MB hard disk, 1.2MB 5¼-inch or 1.44MB 3½-inch floppy disk drive, monochrome card and monitor, DOS 3.3, \$1,995; with VGA card and monitor, \$2,599.

In Short: Northgate bundles high-performance systems. The competitively priced 286/12 combines hardware and software components to get the most from the 12-MHz AT-Level architecture.

Other specifications and standard features that make this NORTHGATE "YOUR CHOICE":

- Processor—Intel 80286/12 (not a 10).
- Cabinet—Full size desktop case; control panel with system reset button, speed switch (8/12MHz), hard drive in-use light, 200-watt power supply.
- Hard Drive—Microscience 68MB, 28MS access time.
- Controller—16-bit, RLL, 1:1 Interleave for 800,000 BPS data transfer.
- Famed OmniKey/102 keyboard—pick of the pros.
- Floppies—One 1.2MB 5¼ inch; one 1.44MB 3½ inch.
- Monitor—14" flatscreen, amber or white, 1000 line resolution capability.
- Video Adapter—Hercules compatible with parallel port.
- Software—Northgate MS-DOS 4.01 with GWBasic, hardbound covers; PCkwick hard drive caching; Northgate System and DOS on-line user's guide; Northgate Utilities.

All systems are custom configured and manufactured at our production facility in Plymouth, Minnesota. Approximately 80 percent of parts used in Northgate systems are made in the U.S.A.

Hard drive is factory-formatted (we can do this legally because we are a DOS licensee) and system can be unpacked and ready for operations on site in about 10 minutes. Full instructions (written and printed in English) are provided.

SYSTEM OPTIONS:
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 Hard Drives—Up to 600MB SCSI, ESDI, RLL (Northgate believes MFM drives are obsolete)



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RIDING THE FOURTH WAVE ■ BY JEFF ANGUS

Tools to Make Windows Programming Less of a Black Hole

Last week's discussion of tools for Macintosh development generated a fair amount of heat from readers who wanted my scalp for hinting that Mac programming was hard.

They wanted me to put the word out on a distant environment they think is a lot tougher: Microsoft Windows. In their defense, designing for Windows is sticky at best. As Chad Canty, one of the most competent C programmers I ever met, said, "Programming Windows is a black hole from which no light escapes; it takes six pages of code just to say 'hello.'"

But increasingly, businesses are dabbling in Windows, either to improve the productivity of workers who aren't computer-savvy or as a pathway to the hoped-for Elysium of Presentation Manager.

Take heart, corporate developers. There are tools to make Windows coding feasible for mortals — dispersing this technology which could, potentially, increase office productivity. And none of them is a me-too. They take different approaches, serve different communities, and cover different cultures. I call them Better, Smarter, and Faster.

BETTER. The oldest, Actor from The Whitewater Group, is an object-oriented language. It takes great advantage of the Windows environment to produce a more coherent programming interface. It's a real programming language (something to the left of Assembly but to the right of Dbase on the scale of terror), which provides all the Windows tools but with a far more usable, cleaner syntax.

The limiting factor is memory. Anything more ambitious than Reversi built on Windows takes up lots of memory. Actor is no exception. Last year, Whitewater combined the genius of creator Chuck Duff and the wizardry of ex-Microsoft John Pollock to carve out more memory than the earlier version had. It's enough for average programs, but some larger ones will suffer.

Actor is best for shops that have tolerance for new ideas and professional programming resources available, or for people interested in a true object-oriented language. It's a much better solution for coding Windows than the SDK.

SMARTER. Case-W is a more recent offering that will make far more productive the C coders who've been attacking Windows. The Caseworks Inc. product is an easy-to-use interface builder for Windows programs. It takes you through the process of building windows, menus, and buttons, giving you control over everything intrinsic to Windows. Once you've designed and named the menu items, dialog boxes, etc., you produce application source files. The resulting source is good-looking, readable C code that takes care of all the tedious, non-process code that makes corporate Windows coders tear out their hair.

Case-W is best for operations that have available C coding resources and want to produce optimal code for the lowest cost. The Caseworks' Case-W is the smart way to optimize Windows development productivity.

Jeff Angus was a systems analyst and technical support specialist for a consulting firm. Comments are welcome. MCI Mail: jangus.

FASTER. If your company has respectable Dbase coding ability and hasn't discovered Dbfast/Windows yet, you're in for a pleasant surprise. The Bumblebee Software Inc. product extends the Dbase language to support the creation and manipulation of the Windows interface set. It includes an intermediate compiler, so you suffer less for the overhead of the Windows environment.

For some shops, Dbfast is the best of

both worlds — reclaiming existing code and programming know-how while vaulting into Windows, which many tout as the wave of the future. I ported a small DOS Dbase program of mine to this environment, and added some Windows interface. It ran fine.

I haven't had a chance to give the product a torture test yet, but for any shop that doesn't have (or want to spare) C coders for Windows programs, but

wants to see what's to be gained, this is the fastest entry into that world.

Bumblebee Software Inc., 1715 114th Ave S.E., Suite 120, Bellevue, WA 98004; (206) 462-0130.

The Caseworks Inc., 1 Dunwoody Park, Suite 130, Atlanta, GA 30338; (404) 399-6236.

The Whitewater Group, 906 University Place, Evanston, IL 60201; (312) 491-2370.



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TECHNOLOGY SHOW ■ BY GEORGE MORROW

Digital Video Interactive Rates 'Thumbs Up' for Filmmaking

Most of the time, Intel Corp. plays the perfect role of a company the PC industry loves to hate. Its products cost too much and it has raised the practice of monopoly to an art form. Also, it fends off competition with lawyers instead of marketers. Every now and then, though, the company rises above this role to invent new kinds of

technology. And then, even its most dedicated critics must applaud. I'm thinking about DRAMs, microprocessors, and EPROMs. Intel created these products — and changed the landscape of computing in the process.

Well, the company's done it again. Except this time, it's rescued a technology rather than inventing it. The technology is DVI, which is an acronym for Digital Video Interactive.

DVI is a group of real-time compression and decompression algorithms for video. With it, five minutes of digital video data fit on a 30-megabyte hard disk. And with the right display hardware, full-motion video can play across a PC bus to a display.

Scientists at Sarnoff Labs developed DVI before RCA went out of business trying to sell CED video players against VCRs.

When GE picked up the remains of RCA, it didn't understand DVI's possibilities. Fortunately, Intel did and was able to buy the technology for a very attractive price.

DVI will fuel a double-barreled revolution in computers. PC started with software that were ASCII text. The Macintosh brought us to the era of cartoons with icons and dialog boxes. DVI will bring full-motion video to PC screens. A completely new user interface will develop from this as chips surrounding this technology become standard for video display cards.

The other half of this revolution, however, is where the real excitement lies. It relates to entertainment and extends what has already happened in music. Digital models for musical instruments are now well-developed. Many are virtually indistinguishable from the original instruments. Moreover, with the advent of 32-bit processors and large hard disks, many of these models can now run on PCs, thus changing the way music is created. For the first time, composers need not rely on performing musicians to interpret their work. The composer can now decide exactly how his music will sound.

Can we apply these same ideas of modeling to motion pictures? Soon, there'll be as many VCRs as TVs. The appetite for new films will mushroom as the studios exhaust the material now in their vaults.

And finally, even with all the advances in technology, the cost of making movies continues to escalate.

Because of these factors, the movie industry is going to have to become more productive. And this is where DVI comes in. It has the capacity to compress full-motion video by a factor of about 100. Thus, the requirements of digital video data on disk drives and I/O busses is almost the same as digital audio. This means that it's possible to use computers to model scenes for motion pictures. The only major barrier is a digital model for actors.

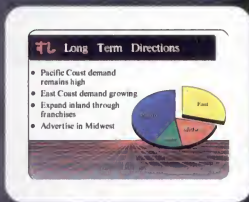
Conceptually, this isn't as difficult as it might seem. After all, a skull has a certain shape. And muscles attach themselves at fixed points. So, facial expressions are problems in mechanics that are quite suitable for computers. Sure, it's going to take a lot of work. However, it's really no more difficult than musical instrument modeling. And after it's developed, directors will have the same freedom of expression computers have given to composers. They won't have to spend hours trying to coach the right expression from an actor. With a computer model, they'll know if such an expression is possible and how to create it.

Of course, it won't be all roses. The legal issues of copyright protection will scale new heights. With digital models for the human face and form, think of the infringement issue. And how about look and feel? When will the look and feel of a model be too close to a real performer. The lawyers are going to have a field day.

However, we viewers will have one too. Just imagine the possibilities when stars like Tom Hanks and Carole Lombard can appear in the same film.

George Morrow is a hardware designer and consultant who has spent 15 years in the microcomputer industry. The views expressed are his own.

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MACINTOSH

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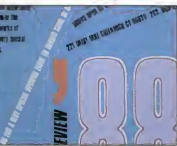
INSIDE

HEAD-TO-HEAD

The Shiva Netmodem and the Hayes Smartmodem 2400M are the only modems on the market intended to work specifically with Mac systems on AppleTalk networks. Here we look at the two products and find that they both perform extraordinarily well... **\$6**

REVIEW

Letra Studio is a text design tool that offers a wide range of type manipulation features... **\$12**



IMPRESSION

Sun Remarketing has resurrected the long-dead Lisa — the Mac progenitor — as a workable computing solution for people looking for cheap Macs... **\$14**

FIRST LOOK

With Mac Write II, Claris adds a number of innovations to its original program, which defined the look of many Mac applications... **\$15**

REVIEW

Color Printer Uses Thermal Technology

By STEVE IRVIN INFOWORLD TEST CENTER

The Tektronix 4693DX Color Image Printer, one of the only available color Quickdraw printers, provides high-density color output for the Macintosh II using as thermal-transfer technology driven by a Quickdraw interpreter. Priced at \$8,995, it is targeted at graphic designers as well as presentation graphics and electronic publishing users. The printer comes set up to run with an IBM PC or compatible, but a Mac II needs a parallel interface card to talk to the Tektronix.

FEATURES:

The 4693DX is an interesting piece of hardware. At its heart is a 300-dpi thermal engine designed by Sharp to Tektronix specifications. The printer transfers colors by pulling a transfer roll that contains waxed ink in four basic colors (yellow, magenta, cyan, and black) across the thermal head as many as four times for each image. This melts the ink and fuses it to the paper, producing a variety of color combinations. Because the thermal head has thousands of heating elements, resolution is crisp and well-defined; thermal output often looks better than that produced by laser print-



The 4693DX Color Image Printer is one of the few color printers to support Quickdraw.

ers. The 4693DX accommodates 8½-by-11-inch and 8½-by-14-inch thermal paper as well as transparency film.

The 4693DX is a bulky unit; it has a footprint of 21.8 by 21.2 inches, and the unit weighs 99 pounds without media. It's 12½ inches tall, and the sheet feeder takes on an additional 13 inches in length. This device definitely needs its own work space or table.

The printer has four parallel input ports at its rear to allow for concurrent

attachment of four separate IBM PC, Macintosh, or other system printers.

When printing on letter-size thermal paper, the 4693DX has a maximum print area of 8.1 by 8.3 inches — a limitation common to thermal technology and, in this instance, due to technology used by Sharp and Tektronix in the engine design. The print area increases to 8.1 by 10.6 inches when you use 8½-by-14-inch media.

A printer driver for the Macintosh is

Color Quickdraw: Is Anybody Out There?

When we first decided to evaluate Quickdraw color printers, we thought there would be enough of them to do a comparison of products. That means at least two. To our surprise, by the time our testing deadline arrived, the only printer we could get our hands on was the Tektronix.

What's happening? First, to be fair, we must report that Apple is shipping two Quickdraw printers that support color: the Imagewriter II and the Imagewriter II LQ. These dot-matrix printers are most commonly used for monochrome output, but multicolor ribbons are available and color printing is possible. With high hopes, we got one of each printer in our lab and fired them up — with hideous results. The color output samples had jagged lines, poor color, and generally awful quality. The quality was so bad, in fact, that we decided they should not even be evaluated as color printers. Most software does not support the Imagewriter in a color mode; the only product in our test suite that did provide color Imagewriter support was Aldus Persuasion.

The only other printer that was supposedly shipping was available through Computer Friends, in Oregon.



HP's Paintjet now connects to the Mac.

Manufactured by Mitsubishi, the Panchroma CHC345 color Quickdraw printer is apparently in extremely short supply; so much so, in fact, that Computer Friends had none to ship to us for review and said that Mitsubishi had none in inventory even to sell.

At that point, the outlook was mighty bleak. Several hot Quickdraw prospects, the Hewlett-Packard ColorPrinter from Sharp, and the Tektronix Color-quick ink-jet printer were announced but unfortunately would not be available until late spring.

Ironically, just as we went to press, Hewlett-Packard announced that the Macintosh/Quickdraw interface for the HP Paintjet had just begun to ship. The Paintjet supports 256 colors on the Macintosh II and eight colors on the Macintosh SE and Plus. Using thermal ink-jet technology, it offers 180-dpi resolution as well as near letter-quality text at the respectable speed of 167 cps. The printer interface kit includes Times, Helvetica, Courier, and Symbol fonts in 10- to 36-point sizes. The HP Paintjet color-graphics printer costs \$1,395, and the interface kit is \$125. We reviewed the IBM PC configuration of the HP Paintjet in our February 8, 1988, Product Comparison of color printers (Page 45); a review of the HP Paintjet with its Macintosh interface is planned for the future.

So, if you need a color printer to run with your Macintosh and you don't want to pay for Postscript support, you now effectively have two Quickdraw options. Other than that, it's all black and white.

More information on the HP Paintjet can be obtained from Hewlett-Packard Co., Inquiries, 19310 Pruneridge Ave., Cupertino, CA 95014; (800) 752-0900.

— Serge Timacheff

supplied by Tektronix with the interface card, which fits inside the Mac II, and any Macintosh software product should work with the 4693DX.

PERFORMANCE:

While we have tested both Quickdraw and color printers individually, our look at the Tektronix 4693DX was a step into uncharted territory due to its unique combination of features and its lack of comparable competition. We designed a set of criteria for rating performance objectively.

We tested the printer on a Mac II with 5 megabytes of RAM and a 256-color Apple monitor. We ran our tests under

System 6.0.2, using fonts supplied by Tektronix. Our software test suite included a Microsoft Word document, two Persuasion slides, and several Pixel Paint color images. The color slides and images were printed in high-resolution 256-color mode, and the Word document was printed in black.

Persuasion slides printed slightly faster than Pixel Paint images, but all color printouts took less than 2½ minutes to process. Our test document was just over four pages long and took eight minutes to complete in text mode. Quickdraw is typically faster than Postscript in printing graphics. As a graphics printer, we rate the Tektronix's speed good. (As a text-

only printer, the Tektronix is obviously not a wise choice.)

The 4693DX offers a variety of adjustments to improve output quality and speed. There are five palette options and two ways of maximizing picture sizes. A "terminal" color adjustment lets you incrementally lighten color images. Also, a color-exchange option lets you switch one pair of colors for printing, separately from what is on the monitor.

Image reproduction was true and solid, and colors (those with little or no white in them) were strikingly bold, but as shades grew lighter, the colors became more grainy.

Several stock Pixel Paint images we

printed looked very nice. However, while shapes and lines were true for all drawings, the colors and shading did not always meet our expectations. We were disappointed with Tektronix color fidelity in particular hues, as neither screen shades nor Pantone (PMS) colors were reliably reproduced despite our efforts at changing various output parameters. Another problem experienced was color shading of shadow boxes created in Persuasion.

On our screen we saw gray, but the printer defined the color consistently as a mucky charcoal. In general, color output was unpredictable, and we also noticed occasional blotches where ink failed to adhere properly to transparencies.

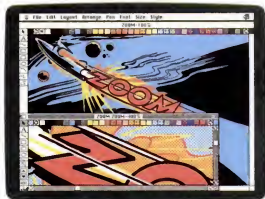
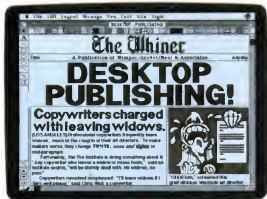
Aside from these problems, output quality was generally impressive. The problems we encountered were not pervasive. As a result, we rate output quality good.

Tektronix includes with this printer three font families (Courier, Helvetica, and Times) and a symbol character set. Third-party bit-mapped fonts for Quickdraw printers are also available. While font availability is an advantage of Quickdraw, font scaling is not possible. Consequently, if the appropriate font size is not installed in your system, printed fonts will be limited to your screen resolution of 72 dpi. In order to print well-defined text using a 300-dpi Quickdraw printer, it is necessary to install fonts that are four times as large as you want to print.

The printer can then crunch the oversized font tables, making them four times as dense.

For example, to print text using a 72-point font, a 288-point font would need to be loaded into the printer's memory. As these larger sizes may not be readily available, the immediate alternative is to print out the screen's lower-resolution 72-point font. The result is blocky and unattractive.

According to Tektronix, this is not true across the board; Quickdraw tries to take advantage of the best resolution it can and a 36-point font, for example, is more likely to print with a resolution of approximately 150 dpi. If font flexibility is crucial to your work, however, Postscript is probably the answer; Tektronix provides a Postscript language-compatible upgrade for \$9,995 for the Macintosh and for \$6,995 for the IBM PC. (These



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CLARIS



This output sample from Studio/8 was printed out on the Tektronix printer.



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The first name in disc drives

prices are above and beyond the price of the printer itself.)

We found one bug while printing our text file using a Courier font. Character spacing shifts radically on underlined characters, causing characters to overlap. Tektronix acknowledges the problem and is currently addressing it. Also, underlining in the Times font looked thin and indistinct. Considering that the vendor does not claim to support Microsoft Word and considering the font limitations as well as the advantages, we rate font support good overall.

The standard Tektronix memory configuration includes 4 megabytes of RAM. Because the DX can begin printing a full-color high-resolution image while still loading it into memory (unlike Apple Laserwriters), 4 megabytes should be sufficient for moderate use. For heavier use, more memory speeds up printing by storing multiple images at one time, and upgrades are available in 4-megabyte increments for \$2,500 each. The maximum configuration is 12 megabytes. We rate memory excellent.

DOCUMENTATION:

Documentation for the 4693DX consists of two user guides — one for the printer, and one specific to the Mac II. We found both manuals clear and easy to read, with detailed illustrations for maintenance and installation.

For novices, step-by-step procedures are included for installing both the board

"Tektronix includes with this printer three font families (Courier, Helvetica, and Times) and a symbol character set."

and the printer. Each manual contains a complete table of contents and index, and the printer user's guide has a glossary of terms. Appendixes list machine specifications and technical information. The six printer error messages are covered, with

clear explanations and suggested actions to be taken. We rate this top-notch documentation excellent.

SETUP:

Setting up the Tektronix 4693DX for use

with a Macintosh II took us roughly 30 minutes. We had to insert the interface card in the computer and cable the Mac to one of the printer's four parallel ports. The supplied cable is bulky and requires some space at the rear of both the printer and the Mac.

Consumables consist of a waxed ink-transfer roll and print media; replacing these items is not an intimidating process. Our printer arrived with the color-transfer roll already installed, but the procedure for replacing it was documented on a label in the machine. Media consist of either thermal sheet paper or transparencies, which fit into a standard-style paper tray on the printer's side.

REPORT CARD INFO WORLD

COLOR PRINTER

Tektronix 4693DX Color Image Printer

Criterion	(Weighting)	Score
Performance		
Speed	(125)	Good
Output quality	(200)	Good
Fonts	(75)	Good
Memory	(75)	Excellent
Documentation		
Documentation	(50)	Excellent
Setup		
Setup	(75)	Very Good
Ease of use		
Ease of use	(175)	Very Good
Serviceability		
Workmanship	(50)	Good
Support policies	(25)	Good
Technical support	(25)	Poor
Value		
Value	(125)	Good
Final score		6.9

PRODUCT SUMMARY

Company: Tektronix Inc., Graphics Printing & Imaging Division, Mail Station 63-447, Wilsonville Industrial Park, Wilsonville, OR 97070; (800) 835-6100, (503) 642-8000 in OR (you can call collect).

List Price: \$8,995.

Pros: Excellent memory expandability; clear and concise documentation; built like a tank; easy to use.

Cons: Bulky and heavy; short warranty; technical support often inaccessible; color output not always WYSIWYG.

Summary: A rugged color thermal printer which provides good overall output for proofing. Its Quickdraw support offers graphics flexibility with some font-handling deficiencies.



Switches on the printer are set to default values compatible with the Mac II. Self tests can be run after installation from the front control-panel windows to assure the 4693DX's functionality. Lifting and maneuvering the printer into place is a two-person job, because of its size and weight, which was the only difficulty we experienced during setup. We rate setup very good.

EASE OF USE:

Once set up, the Tektronix printer is easy to use. Programming keys on the front of the printer let you select a variety of parameters, and a two-line LCD display next to these keys is easy to read and the

"The Tektronix 4693DX makes color-thermal printing affordable by using Quickdraw technology."

sole means of indicating status and setup information. Most messages are shown in plain English and are far better than a series of flashing lights, codes, or beeps. All print options are controllable from the Tektronix print driver on the Macin-

tosh using three screens — basic page setup, novice options, and expert options.

You can choose to have the front-panel configuration override the software. The color-transfer roll is the only internal consumable you'll ever need to

replace, and the procedure is fairly simple. Access to the inside of the printer is easy, which makes clearing paper jams and cleaning the thermal head (with the tool provided) quick procedures. Replacing the print media is also simple. Bearing in mind that color printers are somewhat more complicated to use than monochrome machines, the 4693DX was impressively unimintimidating.

We rate the Tektronix's ease of use very good.

SERVICEABILITY:

Tektronix builds this printer like a tank. The outer "armor" consists of sturdy plastic panels on all four sides, and two heavy, die-cast hinges attach the front maintenance panel to the frame. A top unit is a metal panel built to withstand much more than typical daily office use. The inner frame is die-cast metal and the engine is solidly built. The electronics are neatly laid out and assembled but show signs of rework and late design changes. We found wire jumpers on two of the four boards we examined, as well as a capacitor soldered across two integrated circuit chips on each of two memory expansion boards.

In its current configuration, the capacitor leads could come into contact with other legs on the chips. Weighing extreme durability against a somewhat risky board setup, we rate workmanship good.

The 4693DX comes with a 90-day on-site parts and labor warranty, with extended warranties available. Repairs are coordinated directly with the company or through individual dealers who notify Tektronix when a product needs repair. Technical support is unlimited and available either through the company on a toll-free line or through any one of 50 field offices. There is also a quarterly newsletter.

We rate support policies good, limited by the short warranty period.

Two of the four times we called technical support we received no callback within a two-day period. The other two times we received a return call within an hour and were helped almost immediately on another occasion. The technicians were eager to help us with our problems and offered in-depth assistance when required. Their knowledge of the product was thorough. Despite the quality of the help we received, we did not receive it often enough. According to our criteria, we must rate technical support poor.

VALUE:

The Tektronix 4693DX makes color-thermal printing affordable by using Quickdraw technology. Its competitor, the QMS Colorscript 100, is a Postscript thermal printer with far superior output, but it costs about \$13,000 more. On the Quickdraw side, Apple's Laserwriter II SC and General Computer's PLP offer monochrome laser technology at substantially lower prices. Tektronix has married Quickdraw and color-thermal technologies into one unit and presented them for \$8,995, which we consider a good value. □

Aside from being a tad easier to install than a satellite, the Hayes Smartmodem 2400M™ for the Macintosh® II and Smartcom II® for the Apple® Macintosh make up the most advanced communications system you can put inside a Mac.*

With this modem and software package, you can set up an extensive Macintosh work group system through a feature called HayesConnect.™

HayesConnect™ allows any Mac access to the Smartmodem 2400M across an AppleTalk® Network.

Which means all Macintosh computers on the Network will be able to communicate with or without a modem of their own. This makes for extremely efficient office communications.

THE ONLY COMMUNICATIONS SYSTEM MORE ADVANCED THAN OURS WON'T FIT INSIDE YOUR MAC.

To make them even more efficient, the system offers Smartcom II for the Macintosh. It's the only software designed to take full advantage of the power and graphics capabilities of all of the computers in the Macintosh family. For example, you can program your own on-screen buttons to create a personalized user interface. You also get features like moveable icons, custom color selection and full support of ImageWriter® and LaserWriter® for incredible graphics. You can even run the system unattended using an Autopilot feature. Of course, there is much more you can do with a few simple clicks on standard, easily identifiable icons.

By now it's probably clear that whether they're just used with the Macintosh II or shared by Mac computers on an AppleTalk Network, the Smartmodem 2400M and Smartcom II make a communications system that can't be beaten. At least not by any Hayes.



For your nearest Hayes Advanced Systems Dealer, call 800-635-1225. Hayes Microcomputer Products, Inc., P.O. Box 105203, Atlanta, GA 30348. Apple, Macintosh, Mac, ImageWriter, LaserWriter and AppleTalk are registered trademarks of Apple Computer, Inc. © 1989 Hayes Microcomputer Products, Inc.

RELATED REVIEWS

MACINTOSH QUICKDRAW AND COLOR PRINTERS

Apple Laserwriter II SC (Quickdraw, monochrome), July 25, 1988

General Computer PLP (Quickdraw, monochrome), July 25, 1988

QMS Colorscript 100 (Postscript, color), July 25, 1988

■ HEAD-TO-HEAD

Modems Dedicated to Improving Mac LANs

Shiva's and Hayes' products let Appletalk users share a common pool of modems.

BY STEPHEN T. SATCHEL
AND HEATHER B. CLIFFORD

The Shiva Netmodem and the Hayes Smartmodem 2400M are two of a kind: the only modems now on the market intended to work specifically with Macintosh systems on Appletalk networks. Although the Shiva is an external unit and the Hayes is a modem board that plugs into an empty slot in the Mac II, the functionality of both systems is similar: They let users anywhere on your network share a common pool of modems. A user can take over the use of one of these modems, regardless of its physical location. Until he or she is done with the modem, no other user can interrupt its communication.

We were pleasantly surprised to find that both products worked extraordinarily well. We had a hard time finding communications software that wouldn't run on these modems as well as it did on modems connected directly to the Mac's serial port.

WHY SHARE MODEMS? A major advantage of shared modems on networks is that they amortize the cost of a small number of modems over a larger number of users. Most people use modems sporadically, so instead of installing a separate modem and its dedicated phone line in each Macintosh (at a hefty price), pooling the phone equipment lets many people split the cost of the hardware and phone charges.

In addition, shared modems help ensure continuous productivity. When one of the modems in a one-modem-per-user setup fails, that user is basically out of luck. But when a network modem or a phone line fails, users can ignore it and turn to one of the other modems or lines on the network. Shared modems also make it easier to cope with defective hardware or phone lines, simply because you don't have to take data off the Mac affected by the failure and move them to another machine.

With shared modems, you can designate specific modems for particular functions. For example, you can set up one general-purpose modem, a second for incoming calls, a third for outgoing calls, and a fourth (if traffic warrants it) for outgoing long-distance calls.

Another advantage of sharing your network isn't well-thought-out, but these communications resources can create more problems than it solves. The good news is that once you've done the planning, the hardware — at least the two modems discussed in these reviews — takes care of itself.

VOICE AND DATA DONT MIX. Whenever someone suggests adding modems to a network, someone else invariably wants to know why the data lines can't go

through company switchboards. If you're lucky, another person will point out that PBXes — especially digital ones — are notoriously unfriendly to modems, adding line noise and distortions that can garble transmissions beyond intelligibility.

What's more, outgoing modem calls can tie up lines that would otherwise handle incoming voice calls; and dedicated outgoing PBX lines for modems cost more to install than you'd pay for several months' service fees for a non-PBX line. Another problem is that modems making incoming calls through your PBX have no way to tell the operator which of your modems it wants to talk to.

In short, it makes sense to keep the PBX for humans and let the modems have dedicated, separate lines (whose basic telephone company service charges are typically less than \$40 per month per line).

"A major advantage of shared modems is that they amortize the cost of a small number of modems over a larger number of users."

Netmodem V2400

SHIVA CORP.

Any standard external modem can be connected to a Macintosh's serial communications port. However, there is only one external modem on the market today that can be connected directly into a network of Macs linked via Appletalk: the Shiva Netmodem.

This modem, available in both 1,200- and 2,400-bps versions, was designed expressly to handle communications for networked Macs, from the Mac Plus to the Mac IIX.

FEATURES:

We tested the Shiva Netmodem V2400. It fits into an Appletalk network as a separate node, as do Macs and LaserWriter printers on a LocalTalk network. Although the number of modems in any given segment of the network can range up to the 32 devices allowed per segment, Shiva reports some performance degradation before that limit is reached. However, this is a limitation of Appletalk, not the modem.

Within the Appletalk network, you select one or more modems in the same way you do printers: You click on them in the Chooser desk accessory. You also can name modems for particular uses. For instance, you can specify that three modems in a modem pool be designated for outgoing calls and one for incoming calls; this way you ensure that you'll always have a modem free to handle incoming data. (If any particular modem in a specified group is busy when someone tries to use it, the Netmodem software tries another modem. If they're all busy, the software notifies you when one becomes free or gives you the option of giving up.)

Any Macintosh system with a Hayes-compatible modem can dial into a

Netmodem-equipped network using the Dial-In network access program that comes with the Netmodem.

The Netmodem operates at 300, 1,200 (both Bell and CCITT), and 2,400 bits per second. It uses the Hayes AT command set and provides two levels of password protection. Remote users calling in to an Appletalk network have to give the right password before the Netmodem will give them access. The network administrator can set a separate password that prevents unauthorized tinkering with the configuration of the network.

The back panel of the Netmodem does not have a second RJ-11 connector (the type you plug a standard phone line into). According to Shiva, this is a design feature: If it were possible to connect an additional telephone line to the Netmodem, someone using the phone line for a voice conversation could disrupt a data transmission, or vice versa.

The Netmodem, while intended mainly for use with the 230-kbps Appletalk network, also works with the Sun/Top's FlashTalk network, which is three times faster.

Shiva Corp. has taken some trouble to provide familiar details for people used to working with modems dedicated to their own computers. The Netmodem software displays, on your Mac screen, the front panel of a standard external modem minus only the Modem Ready and Terminal Ready indicators. When the Netmodem is working, the "LED indicators" in this image (which show up red on the Mac II color screen) flicker and blink, providing an accurate representation of the LEDs on the front of a stand-alone modem. This may be overdesign, but we like it.

The hand-holding isn't only visual. The Netmodem comes with software that lets you assign a name to the modem, the phone line and sends the information through Appletalk to the Mac, where the Netmodem software in the Mac plays it out through the Mac's speaker. Just like home.

In addition to the Netmodem software, the package comes with the Dial-In network access program and a copy of Free Term, Version 2.0, a public domain communications program.

PERFORMANCE:

We focused our performance testing on the network capabilities of the Shiva Netmodem. We planned a number of calls to information services and other networks, and experienced no difficulties. In particular, we had no problems with line noise.

We placed the calls using several communications programs: Smartcom II for the Mac, Microphone II Mac Terminal, Version 2.3; Compuserve Navigator, Version 2.1; and Free Term 2.0. We ran these programs on a Mac II connected via



The 2400M plugs into any empty slot in a Macintosh and can be accessed by other Macintoshes on an Appletalk network.

Appletalk to the Netmodem, and we also ran Mac Terminal and Microphone on a Mac SE in the same network. All Macs on the Appletalk network had System 6.0.2 installed.

When we tried to use the Netmodem on an Appletalk network that was performing multiple tasks (such as printing graphics and running a disk-intensive application) while sending sound, our Mac II lost contact with the Netmodem. Under less congested conditions, the Netmodem functioned with few problems.

The most noticeable change in performance was that as the network load increased, the quality of the synthesized sound dropped, but this was a minor annoyance. Also, the emulated modem "lamps" indicate whether the modem is sending or receiving, instead of indicating actual bit transfers, as do standard external modems' status lamps. Again, this is a quibble.

The Netmodem works well under most conditions and is adept at filtering line noise. But on overloaded networks, communications between the Macs and the modem are chancy. We rate performance good.

DOCUMENTATION:

The manual that came with our Netmodem goes into some detail about Version 1.0 of the Netmodem software. There is also a file that is an addendum to Version 2.0 of the software. Unfortunately, we were working with Version 3.1 of the software. Shiva said it will ship final updated documentation in April, and the preliminary copy looks improved.

The installation section of the manual refers to a program called Namer, which lets you assign a name to the modem. But Namer — which is an Apple utility that must be customized for each device on an Appletalk network — was nowhere to be found in the Netmodem software. With a call to Shiva's technical support staff, we learned the naming function is now called Internet Manager. This undocumented utility is the only way to change the Netmodem configuration. There are no on-disk updates to the manual.

On the other hand, the manual's information about operations is accurate. The explanations of error messages are clear and suggest corrective steps, although we couldn't find any mention of the disconnection-under-overload problem described earlier.

Separate pamphlets on the Dial-In network access software and Free Term program are up-to-date.

While there is no quick-reference card, the Netmodem does help more than compensates for the omission. In fact, the help screens and menus, which cover everything from the AT command set to modifying the Appletalk network, are among the best we've seen for any software.

The impressive on-line help is offset by the written documentation, which is largely out-of-date. We score it satisfactory.



The Shiva Netmodem is an external device that can be connected anywhere along an Appletalk network.

SETUP:

Inaccurate documentation cost us some time at the beginning of the setup procedure. However, after Shiva's tech support staff told us which install program to use and how to get started with it, the entire operation took less than 10 minutes.

Despite the lack of accurate documentation, setup was easy and fast enough to earn a good score.

EASE OF USE:

One of the most frequent complaints about network modems is that you can't see or hear what's happening when you try to make a connection. The Netmodem solves this problem with its on-screen display of a standard external modem's front panel, and by digitizing modem sounds and piping them through your Mac. However, there is no Netmodem command that raises or lowers the volume, and even at the Mac speaker's lowest setting, the modem sounds are anything but unobtrusive. The only alternative is to turn the speaker off altogether.

The Mac Chooser desk accessory makes it easy to select the Netmodem (or Netmodems) you want to use. To avoid conflicts between users, once a person begins using a modem, no one else can access it. The Netmodem will queue requests to use the modem, and indicate when it's available.

One significant sign of the Shiva Netmodem's popularity is the fact that software engineers (including the designers of Microphone III) are making changes in communications programs to make them work more consistently within the Netmodem's environment.

Meanwhile, Shiva has simplified the system administrator's job considerably by putting the three quintessential status

lights on the front of the modem itself: a green lamp for "power on," a yellow lamp for "off hook," and a red lamp for "trouble."

There are other touches that make the Netmodem a pleasure to use: The modem lets you go into command mode from a menu, without having to type "+ + +"; the on-screen help, including descriptions of the AT commands, is available while the modem is working; and the modem displays messages telling you what it's doing (connecting, disconnecting, etc.) while it's doing it.

None of the communications programs in our tests could tell the difference between the Netmodem and an external

modem connected to any of the Macs' serial ports. In other words, you can use virtually any communications program with the Netmodem without worrying about software incompatibility.

Enlightened operating procedures together with intelligent, user-oriented design lead us to rate ease of use excellent.

SERVICEABILITY:

The designers of the Shiva Netmodem put not only the modem functions but the network interface onto a single 5-by-9½-inch two-layer piece of epoxy. The VLSI components are well-spaced, the soldering is admirable, the phone line is protected against power spikes, and no

after-manufacture additions mar the cleanness of the layout. Economy of design and flawless execution earn the Netmodem an excellent score for workmanship.

Technical support for the Netmodem is available Monday through Friday, 9 a.m. to 5:30 p.m. Eastern time. The call is not toll free. There is a one-year warranty on the product. We rate support policies satisfactory.

When we called technical support, the technician we spoke with had fast, accurate, and useful answers to our questions. He even suggested a work-around to a problem we had with Microphone II and the Netmodem (the

MacinStor gives you more crunch per byte.

REPORT CARD INFO WORLD

NETWORK MODEM

Shiva Netmodem V2400

Criterion	(Weighting)	Score
Performance	(400)	Good
Documentation	(75)	Satisfactory
Setup	(75)	Good
Ease of use	(150)	Excellent
Serviceability		
Workmanship	(50)	Excellent
Support policies	(50)	Satisfactory
Technical support	(50)	Very Good
Value	(100)	Very Good
Final score		7.0

PRODUCT SUMMARY

Company: Shiva Corp., 155 Second St., Cambridge, MA 02141; (617) 864-8500.

List Price: \$599.

Requires: Mac Plus or later; System 4.1, Finder 5.5 or later; AppleLink, Phonenet, or equivalent.

Pros: On-screen modem lights; audio at user's computer; very flexible; outstanding on-line help; easy to use.

Cons: Current documentation outdated. **Summary:** Superior network modem that lets many users consolidate data communications easily and without conflicts.

High-Performance Mass Storage You Can Trust. Up to 630 Megabytes, Internal or External.

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Of course, all this has its price. And it's amazingly low. Especially when compared to what you get—or don't get—with other storage subsystems.

Now's the time to put more into your Mac. So you can get more out. For the name of your nearest authorized MacinStor dealer, call (408) 879-0300.



STORAGE DIMENSIONS
A MACINTOSH COMPANY

Netmodem hung up the phone line immediately after making a connection). Given the outdated documentation, installing and operating the Netmodem would have been next to impossible without this level of support. We rate technical support very good.

VALUE:

The \$599 list price of the Shiva Netmodem V2400 includes the modem itself, its external AC power supply, software (for the modem and for network access, as well as the Free Term program), and a standard phone cable. The user provides the Appletalk or Phonetone connector box and the network cables.

The advantages of the Shiva Netmodem over the combination of the Hayes Smartmodem 2400M and the Hayes Connect server software — which sells for nearly the same price — are several: The Netmodem doesn't need any kind of host or server, its operation can't be disrupted by third parties, and freeing it for use by another person doesn't require any specific action by the current user.

The Shiva Netmodem provides a cost-effective way for a group of workers to do data communications. The outstanding ease with which the Shiva Netmodem operates in networks and adapts its configuration to suit each network, together with its moderate price, make it a very good value.

Smartmodem 2400M

HAYES MICROCOMPUTER PRODUCTS

Hayes Microcomputer Products' 2400M Macintosh modem solves the same problem as the Shiva product, but in a significantly different way. Hayes puts the modem on a Mac II Nubus card, which must be installed in a computer on your Appletalk Network.

This modem is one of the first internal modems for the Mac II. A typical Hayes product, it exhibits solid workmanship and reliable operation.

FEATURES:

The 2400M can plug into any empty slot in a Macintosh II, of which there are usually five. (There are six slots in a Mac II, but one is required for the video board.) It also works in the Mac IIx and IIcx, which have three slots. You can fill all the open slots in your Mac II with 2400M modem boards, forming a modem pool that lets a group of workers concentrate and consolidate their data communications.

Although designed specifically to run under the Nubus in Mac II systems, the 2400M uses the industry-standard Hayes AT command set. It operates synchronously at 1,200 and 2,400 bits per second, and asynchronously at the standard data transfer rates of 300, 1,200 (Bell and CCITT), and 2,400 bps. However, it does not automatically fall back to a lower speed if a higher-speed transmission fails.

Hayes has announced an upgrade (which isn't shipping yet) that will let the 2400M do internal error correction and data compression, as well as interface cleanly with X.25 packet-switching networks — in short, perform all of the functions now present in the Hayes V-series modems. The upgrade will be in the form of an add-on board, for which the connector already exists in the 2400M.

The 2400M has an on-board speaker, whose volume you control through software commands issued directly to the modem. Software commands also let you set the configuration, storing two separate configuration profiles and up to four

"The Shiva Netmodem provides a cost-effective way for a group of workers to do data communications."

phone numbers in the 2400M itself.

Unlike the Shiva and other external modems, the internal 2400M is hard to misplace and makes it difficult for unauthorized people to remove it.

The Hayes modem can be used by the

system in which it is installed with no special software. To make one or two 2400M modems available to other systems on an Appletalk network, you install the proprietary Hayes Connect software in the Macintosh II "server" setup as well

as each workstation.

You can also install one or more 2400M modems in an AppleShare server, combining disk and modem services in one machine.

The Hayes Connect software comes with the 2400M. This program, which makes the modem accessible via the Appletalk network, needs 200K of RAM. The 2400M package also includes a communications program, Smartcom II for the Mac. (See Product Comparison of Macintosh communications software in Macintosh Target Edition, March 20, Page S1.) You can buy just the modem, without Hayes Connect or Smartcom, if you don't need an Appletalk modem.

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CLIRIS CAD can reduce the huge number of two-dimensional drawings it takes to get a plane off the ground. But it makes them a lot easier to do.

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Draw the lines of free designs as freely as you wish, from 1.5 inches to 3000 mm.

© 1989 CLIRIS Corporation, 440 Civic Avenue, Menlo Park, California 94025. 415-962-8946. Starter Kit includes demonstration software, manual, workbook and video. Offer expires September 30, 1989. A special

PERFORMANCE:

The Hayes modem had no difficulty placing a series of calls to information services and other networks. It worked fine on regular phone lines, and there was a minimum of line noise.

To place the calls, we used the following communications programs: Smartcom II for the Mac; Microphone II; Mac Terminal, Version 2.3; and the public domain communications program Free Term 2.0. We ran the programs on the same machine in which the modem was installed and also on each of several additional Mac II and SE units connected via AppleTalk to the machine with the modem.

This setup reproduced the conditions under which the 2400M is meant to be used: data communications from one Mac through a second Mac II, connected via AppleTalk, to the outside world (i.e., an on-line information service, BBS, or external network). The first Mac acts as the client machine and runs the communications application and Hayes Connect software; the Mac II acts as the server machine and includes the Hayes modem as well as the Hayes Connect server software.

We used the 2400M on an AppleTalk network of Macs running System 6.0.2. We ran into difficulties only when AppleTalk was subjected to unusually

heavy traffic. (We created an artificially heavy load by simultaneously performing several tasks: sending a complicated graphics figure to a Laserwriter, running a disk-intensive application that called for many reads and writes on the drive in our AppleShare server, and sending sound over the AppleTalk network through the Shiva Netmodem to a third Macintosh.) Under these conditions, the Hayes Connect software displayed a dialog box explaining that the modem had lost its connection with the communications software in the "client" Mac. When we removed the artificial load, the modem worked fine. If you don't send sound across the network, you should be able to

perform multiple tasks and use the 2400M without difficulty.

Under normal network conditions, we experienced no problems with the 2400M. We appreciated the dialog box that warned us when we had exceeded the capacity of the Hayes modem to work across an AppleTalk network. Performance is rated good.

DOCUMENTATION:

Documentation for the 2400M consists of a user guide that describes the hardware, a *Getting Started* pamphlet, a quick-reference manual, and several tutorial files.

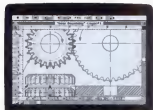
The well-written documentation is complemented by clear charts and line drawings. The main manual is indexed, with a glossary that is close to being a short-form course on the history of data communications.

The only drawback in the collection is that none of the documentation for the Hayes Connect software is provided on paper. All 32K of it (about 6,000 words, or enough to fill a modest-sized pamphlet) is available only on the utility disk — which doesn't help users who don't have a printer handy. This is a minor nuisance, however, and doesn't keep us from rating the 2400M's documentation very good.

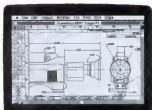
SETUP:

Installing the 2400M couldn't be easier: You insert the board into the slot and move three files from the utility disk into the system folder. There is no need to fiddle with DIP switches. We rate setup very good.

Is to start here.



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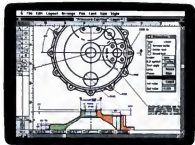
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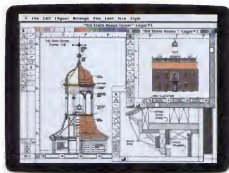
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REPORT CARD **INFO** **WORLD**

NETWORK MODEM

Hayes Smartmodem 2400M and Hayes Connect 1.0C

Criterion	(Weighting)	Score
Performance	(400)	Good
Documentation	(75)	Very Good
Setup	(75)	Very Good
Ease of use	(150)	Good
Serviceability		
Workmanship	(50)	Excellent
Support policies	(50)	Very Good
Technical support	(50)	Good
Value	(100)	Good
Final score		6.6

PRODUCT SUMMARY

Company: Hayes Microcomputer Products Inc., 705 Westech Drive, Norcross, GA 30092; (404) 449-8771.
List Price: \$599 (with Hayes Connect and Smartcom II), \$549 for modem only.
Requires: Macintosh II, IIx, or IIcx with at least 200K of available RAM; Hayes Connect software requires System 3.3, Finder 5.4 or later (System 4.1, Finder 5.5, or later in server).

Pros: Switchless setup; protection against phone-line power surges; easy sharing by two or more systems; two-year warranty.

Cons: No built-in error correction or data compression.

Summary: Built-in network-access software makes this internal modem attractive for use in AppleTalk networks.

EASE OF USE:

If you're used to watching tiny red modem lamps flicker as you do data communications, you'll be disappointed with the 2400M. Unlike the Shiva Netmodem, it doesn't provide a working on-screen display that duplicates the front panel of an external modem.

If you're using the Smartcom II communications program on the same machine in which the 2400M modem is installed, and you're not running the Hayes Connect software, you can use the Smartcom II port-selection menu to choose the modem you want to use. Otherwise, you have to select the modem by clicking on your choice in the standard

"The 2400M, typical of a Hayes product, exhibits solid workmanship and reliable operation."

Macintosh control panel.

One of the 2400M's more appealing features is the fact that communications programs never know, and therefore aren't handicapped by, the location of the modem with which they're working. The

modem can be installed at the far end of a network, but the programs act as though the modem were in the same machine with them.

When you have more than one 2400M in a server configuration, you use the

control panel to select a modem. If no other user has selected that particular modem, it's yours. If it is being used, the control panel tells you who's using it — a nice touch.

After you're through using the modem, you have to take the additional step of going to the control panel and de-selecting the modem, or no one else can use it. The system administrator can also specify a time-out before releasing the modem.

The 2400M offers simple modem selection, and users don't have to worry about installing the communications program in the same machine as the modem. We rate ease of use good.

SERVICEABILITY:

The 2400M is well-designed and well-laid-out, with abundant use of VLSI components. All of the soldering is well up to specifications, and there are no cuts, jumpers, or other additions. The phone-line surge suppression is superb; Hayes put a fair amount of thought and more than the usual number of components into protecting the board from damage by lightning or other spikes on the incoming phone line. Workmanship doesn't get any better than this; it earns an excellent score.

The two-year warranty on the 2400M includes telephone support (not toll free) from 8 a.m. to 8 p.m. Eastern time on normal business days. There is also a non-toll-free 24-hour BBS. Repair or replacement of defective units is at Hayes' discretion, and all service is done at the factory. These factors add up to a score of very good for support policies.

It took us fewer than seven minutes to reach a Hayes technical support staffer who could answer our questions about the 2400M. The staffer we talked to knew the product and the system requirements well. Although he didn't volunteer much information about it, he asked exactly the right questions to determine quickly what our problems were.

In one instance, we got a system alert message that required a system reboot when we tried to run the Hayes Connect software under Finder. The technician told us we should be running the Hayes Connect software under Multifinder — a piece of advice that, although it contradicted the information in the on-disk documentation (which says the software will run under either Finder or Multifinder), turned out to be accurate.

The staff at Hayes is reasonably accessible, prompt, and knowledgeable. We rate technical support good.

VALUE:

The Hayes 2400M, bundled with Hayes Connect and Smartcom II for the Mac, retails for \$599. The modem alone costs \$549. Both of these prices compare favorably with the list price of \$599 for the Hayes Smartmodem 2400 (the non-Nubus external modem that works with any IBM-compatible or Apple system).

The Hayes 2400M is a solidly built internal modem for the Mac II. As an internal modem, it is tough to lose or remove surreptitiously. The addition of the Hayes Connect server software makes it a good value for medium-size AppleLink networks. □

Contributing editor Stephen Satchell has 17 years' experience as a systems designer, product programmer, and hardware evaluator.

Former InfoWorld associate reviews editor Heather Barbara Clifford is coauthor of DBXL and Quicksilver: Programming Beyond Dbase and other computer books.

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Actual performance of your network may vary depending on the quality and length of network cable, network size and configuration. To achieve best performance, you should connect a FlashBox to each Macintosh. Using FlashBox with bridges, gateways, or other AppleTalk-only devices may require network reconfiguration or the address of repeating devices.
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REVIEW

Letra Studio Offers Unique Typographical Features

This fun and easy-to-use package lets users create typographical special effects with text.

BY BARBARA ASSADI REVIEW BOARD

The vast majority of desktop publishing packages allow you to create display type (headlines) in a wide range of point sizes. Depending on the font you're using, the effect can be quite nice. But beyond bolding, enlarging, and italicizing your text, most of the packages offer only limited type manipulation — until now. Letra Studio from Letraset (makers of Ready, Set, Go) lets you swirl, encircle, and stretch display type in a number of ways that can give your display type a unique look. Because Letra Studio offers dramatically increased typographical creativity, we expect it will easily find a place of importance in a well-stocked publishing desktop.

FEATURES:

The essence of Letra Studio is that it lets you create special effects with text. The arc and circle tools let you draw circular

"One of the most interesting features of Letra Studio is its capability to handle circular text."

or curved baselines, upon which text is placed. In addition to curved baselines, you can select other text distortions from a sample menu of "envelopes." You can also develop simple graphics with Letra Studio, or you can combine type customized in the package with graphics from other applications. Gray shades or color can be used on both text and graphics, and the program supports Pantone (PMS) colors. A wide range of remarkably smooth zoom levels allows you to magnify a page up to 800 percent to get a very close look at a text segment. Controls for alignment, kerning, letter-spacing, type height and width, and font specifications are all included. There are two fonts that come with the Letra Studio software, two more are provided free upon registration, and 40 more fonts are available — with even more expected to ship in the near future.

PERFORMANCE:

To begin using the Letra Studio package, you select the text tool and begin typing. Once you have your text typed, you can reshape it to get the precise effect you are looking for. Letra Studio's text tool, which is shaped like a printer's copyediting symbol for "insert," has an active point at the top that makes it easy to position the insertion point — even when the text is in a circle or is angled in some other way.

Although the Letra Studio program is really closer to a graphics application

than a text application, you can enter text and work with it on the screen using typical Macintosh word processing conventions. You can start typing as soon as you open a document, or you can first specify type options. For individual characters or passages you can select the font; unlimited type heights (in points, inches, or millimeters) and widths (expressed as a percentage of standard width, with 100 as standard); and kerning or letter-spacing. With this level of typographical control, Letra Studio allows you to create very unique-looking text, such as letters that are twice as wide as they are tall. This means that you get extra value for each of your display fonts, since you can warp them for special effect.

Letra Studio includes default character spacing for each font. You can reduce or increase character spacing as you like. Characters can be manually kerned (there are also default kerning settings) so closely they actually overlap, and you can select whether the overlapping is left-to-right or right-to-left. Whichever overlapping you select, the setting applies for the entire line. To create a separate new line, which can have its own unique specifications, you can hold down the Command key while you press the Return key, which is uncharacteristic of word processors.

One of the most interesting features of Letra Studio is its capability to handle circular text. To type text in a circle, you set the radius of the circle by clicking and dragging it. You then decide whether to type text inside or outside the circle. If the text that you are typing around a circle eventually overwrites itself, you can simply alter the diameter of the circle to take care of the problem.

Baseline variations are also great fun with Letra Studio: You can move individual characters virtually anywhere above or below the baseline (an example might be superscripted or subscripted letters), and you can control letter positioning by dragging or by 0.1-pixel increments (holding down Command and Option keys while using the Arrow keys). There is a Restore Baseline command that allows you to experiment with changes or distortions and then — if you wish to — return to the original. You can also curve a baseline and alter the curve's proportions.

Letra Studio's most powerful aspect is perhaps its Bezier controls. Its feature, to understand these controls, is best to contrast them with standard object "handles" (little black boxes that appear on all corners of an "invisible" rectangle that holds the arc shape). For example, if you wanted to draw an arc, standard object handles would allow you to stretch or handle the arc while keeping its basic shape.

With Letra Studio's Bezier controls, you can fine-tune an object's shape without the constraints of standard object handles. The controls consist of anchor points and direction lines. Anchor points identify the particular position of points on the drawn shape, and direction lines control the direction and curve of the shape as it moves by the anchor point. By



Letra Studio gives powerful control over text, permitting you to design unique special effects and export them to other applications such as Pagemaker.

moving anchor points and handles, you can define precise shapes and/or baselines for text.

To distort the shape of a section of text, you use Letra Studio's powerful distortion envelopes. (Distortion means any shape change made with an envelope, including scaling and stretching.) To use a distortion envelope, you select an envelope icon from the Effects menu. The envelopes are basic shapes that have handles on them; when you drag the handles, the text contents of the envelope stretch and distort accordingly. Text within a distortion envelope acts as a grouping in the sense that all objects in a single envelope distort together. You can still select and operate on an individual character within an envelope by pressing Option and clicking on it, and then sending the selected character to the back or front.

To transfer data that have been produced using the Letra Studio program, you save the file in either EPS (encapsulated Postscript) or PICT format. We imported an EPS file into both Ready, Set, Go 4.5 and into Quark Xpress 2.0 picture blocks without a hitch in either case. This means that you could, for example, use Letra Studio to create a circular text logo and then paste the logo onto a page set up by one of these desktop publishing packages.

It's important to note that Letra

Studio runs on a 1-megabyte Macintosh Plus and significantly faster on a Macintosh II. In spite of this one little hitch with speed on the Mac Plus, we were actually dismayed by Letra Studio — the package is delightfully entertaining to use and really unleashes your creativity. We rate the Letra Studio's performance very good.

DOCUMENTATION:

It is refreshing to work through a well-done manual that manages to avoid both confusing instructions and missing steps. Letra Studio's manual is a case in point. Important information is logically, and even elegantly, presented in this useful booklet.

The manual includes a tutorial, a user's guide, and a reference section. On-line help for tools is available, and to access it you hold down the Option key while you press the Command key. While typography tends to have a language all its own, Letraset's writers have chosen to keep their manual quite jargon-free, and have included a handy glossary to cover the occasional jargon that creeps in. The only item on our Letra Studio documentation wish list would be a quick-reference card listing the many keyboard shortcuts, which are covered in the body of the manual. We rate documentation very good.

EASE OF LEARNING:

Although installation is easy, the copy of Letra Studio that we received allowed us to use only four attempts at installing the software. The installation program did not function under Multifinder; this was mentioned in a Readme file. According to Letraset, in current shipping copies the installation limitation has been removed, and the program will now function under Multifinder.

A supplied tutorial is helpful to learn the basics of Letra Studio, but you should be able to easily pick up on the fine points after a few sessions at the Macintosh, manual in hand. After a few hours you'll feel a sense of pride in what you're able to produce. Keyboard commands take a little bit longer to absorb, especially since you aren't given a separate list of them. We rate Letra Studio's ease of learning good.

EASE OF USE:

Letra Studio's text features are reminiscent of simple word processors like Mac Write. Text creation is straightforward,

"Letra Studio's text features are reminiscent of simple word processors like Mac Write."

Studio does not use Postscript fonts, nor does it use the resident fonts on your Macintosh: Instead, it uses its own fonts. The fonts are stored as PICT or encapsulated Postscript files, which lets you easily export and print them. Postscript font tables do not contain the right information for Letra Studio to effectively manipulate them.

We found Letra Studio usable but

and editing takes full advantage of the menu structure that is found in most word processors. Letra Studio's graphics capabilities are fundamental, and work the same as graphics features in more sophisticated products. (For very sophisticated graphics requirements, you'll still need a dedicated graphics application like Adobe Illustrator or Mac Draw II.) Even the Bezier functions are reasonably intuitive in Letra Studio. Again, having easy access to keyboard shortcuts would enhance ease of use. We used the software with nary a hitch, and we rate ease of use very good.

ERROR HANDLING:

You are able to save a "snapshot" copy of the current *Letter Studio* document under another name while you keep working on the original document. The saved document can even be stored in another format such as encapsulated Postscript. *Letter Studio's* Revert-to-Saved selection restores the last-saved version of the current document, and abandons all of the changes that were made since the last save. An Undo command in the Edit menu will cancel the last action you took; if this last action was an Undo, the command changes to Redo. We give *Letter Studio's* error handling a score of very good.

SUPPORT:

Letraset offers unlimited technical support on a toll-free number that is accessible during East Coast business hours. In addition, corporate support is available, and on-line technical support is available as well through the Genie bulletin board, which can also be reached via a toll-free number. We rate support policies for Letra Studio very

REPORT CARD INFO
WORLD

TYPOGRAPHICAL SOFTWARE

Letra Studio

VERSION 1.0

Criterion	(Weighting)	Score
Performance	(400)	Very Good
Documentation	(80)	Very Good
Ease of learning	(40)	Good
Ease of use	(120)	Very Good
Error handling	(80)	Very Good
Support		
Support policies	(40)	Very Good
Technical support	(40)	Very Good
Value	(200)	Good
Final score		7.2

PRODUCT SUMMARY

Company: Letraset, 40 Eisenhower Drive, Paramus, NJ 07653-9951; (800) 343-TYPE.

List Price: \$495.
Requires: Macintosh Plus, SE, or II; 2 megabytes of RAM recommended; with Multifinder, 2 megabytes required.

Pros: Powerful special typographical effects; strong support; easy to learn and use.

Cons: Requires at least 2 megabytes for full functionality.

Summary: Letra Studio is an easy-to-use typographical powerhouse that makes it fun and easy to develop unique headlines and graphically oriented text.

“While typography tends to have a language all its own, Letraset’s writers have chosen to keep their manual quite jargon-free.”

good.

When you call Letraset's toll-free number, an automated operator directs you to product information, customer service, ordering, or technical support. Once our calls were routed to technical

support, they were answered within two or three minutes. Staffers were very knowledgeable, and they gave us additional tips beyond simply answering our questions. We rate technical support very good.

VALUE:

If unique typographical effects are important to the publications that you or your company are producing, then you're probably spending a good chunk of money on distortion camera services or graphics assistance of some kind. This typographical software package can give you these same capabilities right on your Macintosh. At \$495, we rate Letra Studio a good value. ☐

Barbara Assadi is manager of employee communications for a major financial services company. She also lectures and consults independently on desktop publishing.

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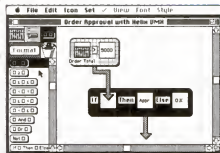
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■ IMPRESSION

A Blast From the Past: The Lisa as a Cheap Mac Alternative

BY TRACEY CAPEIN

While Apple keeps pumping higher-tech solutions into the marketplace, one company is convinced that the Mac's less-than-successful progenitor, the Lisa, still represents a workable computing solution for people looking for cheap Macs.

Sun Remarketing Inc. of Logan, Utah, is upgrading these 6-year-old machines with 800K floppy drives, 20-megabyte

hard disks, and new driver software — Mac Works — that supports ordinary Mac software. The result is a Mac Plus work-alike that sells for only \$1,495. An extra megabyte of RAM costs \$599.

To put this into perspective, in 1983 the Lisa carried a \$9,995 price tag and included a 5-megabyte hard disk. In 1985, the price had gone down to \$5,995 with a 10-megabyte hard disk. Today, a new Mac Plus with a 20-megabyte hard disk starts at approximately \$1,800, and its

screen is much smaller than the Lisa's. By the numbers, the Lisa is a deal. But there's more involved than just money.

My impression of the remarketed Lisa began to develop when I tried to remove it from the box. The system is about twice the size and weight (about 48 pounds) of a Mac. It's larger monitor is built into the same box as the computer. In this way the Lisa's design is similar to that of the Mac Plus and SE, but it's much wider.

The Lisa does not have any I/O connectors in common with the Mac line. The Lisa's two serial ports are 25-pin connectors rather than the standard DB9 or DIN. Fortunately, Sun Remarketing sells printer and AppleLink cables for the Lisa. The system does not have the all-important Mac SCSI port built in, although the company has announced a SCSI interface card that fits in a Lisa slot. (There are three in the Lisa, naturally incompatible with everything else.)

The remarketed Lisa's greatest failure, however, is its software compatibility. We found that small, "well-behaved" applications (like Mac Draw II, Mac Paint 2.0, CAT, and most word processing programs) worked fine. But larger programs — like big Hypercard stacks — locked the machine. (Although the Lisa has 1 megabyte of RAM, the system software that makes it work like a Mac takes up 160K on top of what the normal System and Finder use.) It crashed under most educational programs and anything that used sound in a nonstandard way.

Compounding these problems is the



Sun Remarketing has rejuvenated the Lisa with newer hardware and software.

overall system speed. Applications took a long time to load, even compared to a less-than-speedy Mac Plus. The unit we received also suffered from an annoying screen jitter that made working with the computer very tiring.

The Lisa is definitely not for everyone. If you are a novice computer user, hot to buy a Mac, but can't afford a Plus, save your money anyway and buy the real thing. The Lisa may look like a tempting deal, but you will most likely end up frustrated due to its software incompatibilities.

The best reasons to buy a Lisa are if you're with one of the few companies that still use Lisas or if you're really into obscure computers and love to tinker.

Sun Remarketing Inc., 3663 N. Highway 91, Smithfield, UT, 84335; (800) 821-3221, (801) 752-7631.

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Dana Leighton, HP Chronicle, April 1988

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FIRST LOOK ■ BY MICHAEL J. MILLER

Despite New Features Mac Write II Is Still Easy to Learn, Use

Mac Write, the original Macintosh word processor, practically defined the look of Mac applications as we know them. It was simple, straightforward, and almost intuitively obvious.

However, it just didn't have the features that most users wanted — even in an executive word processor. Other products, like T/Maker's Write Now, were almost as easy to use, and much more powerful. The problem that confronted Apple, and later Claris Corp., was how to make Mac Write more powerful, but keep it easy to use.

With Mac Write II, Claris seems to have succeeded wonderfully, adding a number of innovations to the original Mac Write design. The menus have been extended and the product is more WYSIWYG, displaying multiple columns on-screen and page breaks, headers, and footers as a part of the document. Yet it is still straightforward to learn and use.

Many new features bring it up to par with competitors like Write Now 2.0. For instance, you can now have up to seven documents open at once.

You can now work with up to 10 columns per page, and you can see the columns on-screen; setting this up is quite simple. However, you can't have different numbers of columns in one document.

As before, Mac Write boasts a simple layout. It has easy shortcuts for boldface, underline, etc.; and you pick fonts, sizes, and styles out of individual menus.

One of the most powerful new features is the capability to set up custom styles. For instance, if you often use 24-point Helvetica bold, you could set this up as a custom style and it would appear under the menu and be assigned a control-number key shortcut. You can set as many as 30 custom styles, and the first 10 will be assigned shortcuts. You're limited to setting the fonts, size, style, and color, so it isn't as powerful as the style sheet features in Microsoft Word or Full Write, but it's quite simple to use and probably quite enough for most users.

The program has other innovations regarding fonts and styles. You can choose a solid underline, underlines under words only (not spaces), or double underlines as well as the traditional boldface, italics, subscript, and superscript styles.

Mac Write's spelling features have been vastly improved. Like Mac Write 5.0, it comes with a 100,000-word main dictionary, and this version lets you work with multiple dictionaries (such as those for foreign languages), and it can even check your spelling as you type, beeping or flashing the menu bar on each misspelling. It also comes with the Word Finder DA thesaurus; and it can automatically hyphenate your document.

One of its best features is its capability

to read and write documents saved in many other word processing formats, including the original versions of Mac Write, Write Now, and Microsoft Word 3.0 and Works 1.1. Claris says it will add other formats eventually.

This version also includes a mailmerge facility, the capability to hide and show page guides, invisible characters, and graphics, and the capability to save layout formats as template files or "sta-

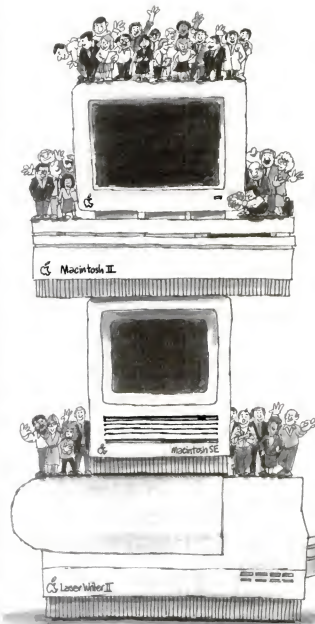
tionary."

There are a few things that could be improved upon. Help is provided through a new resident Hypercard stack, which is interesting as an initial guide to the product, but I wish there was an on-line index so you could more quickly find specific information. I occasionally encountered "unexpected end of file" errors.

Mac Write isn't for everyone. But I suspect that many Mac users will find that

it does everything they need.

Mac Write II is available now from Claris Corp., 5201 Patrick Henry Drive, Box 58168, Santa Clara, CA 95052-58168; (408) 987-7000. The \$249 program requires a Mac Plus or later with at least two 800K disk drives, and System 6.0 or later. Users of Version 5.0 can upgrade for \$65; users of earlier versions of other Mac word processors can upgrade for \$75. □



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Correction:

In the April 3 First Look (Page S11), the number for Daystar Digital was incorrect. The correct number is (800) 962-2077 or (404) 967-2077.

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PRODUCT COMPARISON

Get the Picture?

Nine Popular 14-Inch VGA (Analog) Monitors

BY GARY LEE HENDERSHOT
INFOWORLD REVIEW BOARD
GREGORY SMITH, LAUREN BLACK,
AND JO RAINIE RODGERS
INFOWORLD TEST CENTER

IBM introduced the Video Graphics Array (VGA) video standard two years ago, and it has since become widely available. It is now a popular choice for display output in new systems and upgrades, and for good reason. VGA has elevated graphics and text performance significantly above the previous color standard — EGA — and at an affordable price.

Between graphics and text, VGA's most apparent increase in performance is in graphics. For example, in the standard VGA 256-color mode, you can have near-television-quality images — something not previously possible without very expensive hardware.

VGA was heralded as the new video standard in early 1987, with the introduction of the IBM PS/2 Models 50 and 60 along with the 8503 (monochrome-only), 8512, 8513, and 8514 monitors. IBM's new VGA standard was completely different from IBM EGA, CGA, MDA, or the de facto (non-IBM) Hercules monochrome graphics standard: The signal VGA produced was *analog* — not digital, as had been common — and the VGA video adapter was integrated with the system board, not as a separate card installed into the expansion bus.

Despite differences between VGA and other display technologies, VGA was downwardly software-compatible with the old standards. With EGA, 16 is the maximum number of colors (from a palette of 64) displayable at one time. However, with VGA, up to 256 colors (from a palette of 262,144) can be displayed at once. IBM chose an analog interface to the video monitor for VGA mainly to increase color performance but also for convenience. To achieve 256 simultaneous colors with a digital interface would have required a much larger cable containing many more wires with the additional digital information.

Adoption of the analog interface turned out to be successful. A few months after VGA was introduced with the PS/2, IBM introduced a VGA video adapter designed to fit the XT bus. Within a year's time, other computer manufacturers were introducing their own VGA-compatible adapters and monitors, as were aftermarket video adapter and monitor vendors.

With all the well-deserved attention and accolades that VGA has received recently, you might believe that EGA and Hercules Graphics video are doomed to extinction. This is not the case, however: EGA and Hercules Graphics will be



around for years to come. It could be possible that you really may not need VGA and that EGA or Hercules Graphics will suffice perfectly, depending on your applications. You could save some money by not going with VGA (although in some cases, VGA is now actually less expensive than EGA) and the price-to-performance ratio is as good as ever for EGA and Hercules Graphics video adapters and monitors, with a wide variety of manufacturers still fully supporting them.

If all you need is a bit more graphics resolution than standard EGA provides, the performance of extended EGA adapters is close to standard VGA in the 16-color graphics modes and even a bit ahead of standard VGA with some extended text modes. But, to use these extended EGA modes, you will need a multisynchronous (multifrequency or auto-sync) digital (TTL) monitor. A standard EGA monitor will not work, since it cannot synchronize to the higher horizontal scan frequencies that extended EGA requires.

With the cost of extended EGA, you

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will come close to the cost of real VGA. If you prefer or need a monochrome and you have software that will support VGA, you will delight in monochrome VGA's capability to produce continuous monochrome tones in 64 shades of gray—not the dithered (simulated) grays Hercules Graphics produce.

But, unlike EGA, the difference in cost between monochrome VGA and Hercules Graphics is significant. For an upgrade to VGA, you need a VGA video adapter and, unless you already have an analog/digital multisync monitor, you'll need a VGA monitor. When deciding on a VGA video adapter, make sure it is supported by the software you are going to use. You will be better off if you insist on VGA compatibility for all modes. Competition in the quickly expanding VGA market is beginning to overshadow competition in the EGA market, and the VGA market—because of the many reasons—possibly has more potential for high-end and high-end for VGA video adapters and VGA monitors as well as a very healthy market.

"True-blue" IBM VGA provides color graphics modes of 320-by-200 resolution in 256 colors or 640-by-480 resolution in 16 colors (or 720 by 400 in a text mode). IBM-standard VGA provides a high-resolution monochrome graphics mode of 640 by 480 in 64 shades of gray. Standard IBM-mode VGA is all many users may need for their particular applications, but if you need more performance, it is now available. Not to be confused with the software you are going to use, aftermarket video adapter manufacturers are now providing extended VGA modes (resolutions) along with the IBM standard modes and are supplying custom graphics and text drivers for such software as MS Windows, 1-2-3, and Autocad. Some of the impressive numbers showing up in specifications of VGA

“If you need monochrome and you have software that will support VGA, you will delight in monochrome VGA's capability to produce continuous monochrome tones in 64 shades of gray.”

adapters are graphics modes with resolutions of 640 by 480 in 256 colors, 800 by 600 in 16 or 256 colors, 1,024 by 768 in 16 colors, 1,280 by 800 in four colors, and text modes producing 75 rows with 100 columns and 44 rows with 132 columns.

The current direction of some VGA video adapter manufacturers is to provide pseudo-8514/A performance. (See accompanying sidebar, "IBM's Other Analog Adapter," Page 62.) Although not the true IBM 8514/A resolution of up to 1,024 by 768 in 256 colors, some of these so-called super-VGA adapters can provide enough performance to sway users away from the expensive 8514/A standard.

In order to use these extended VGA modes, you must purchase a multisync monitor, since each mode has a different horizontal scan frequency. The advantages to acquiring a multisync monitor are many, and in particular you will be able to utilize the extended graphics modes that the large VGA video adapter adapters have demonstrated. Standard IBM VGA produces a horizontal scan frequency of 31½ kHz and a vertical scan frequency of 70 hertz. Nonstandard, high-resolution VGA modes may require a monitor capable of a horizontal scan frequency of up to 35 kHz or higher. Instead of choosing a fixed-frequency monitor and being dedicated to a single

video standard, namely IBM VGA, a multisync monitor could be chosen with the capability to utilize the extended graphics modes that the aftermarket has developed. Some of the elite multisync monitors are capable of auto-synchronizing to horizontal scan frequencies as high as 65 kHz; common horizontal scan frequencies range from 15½ kHz to 35 kHz and vertical scan frequencies from 50 hertz to 80 hertz. A resolution of 800 by 600 requires a 35-kHz scan frequency. As an additional feature, several VGA-compatible multisync monitors offer a digital interface as an upgrade path for EGA users (and sometimes CGA and Hercules Graphics users as well).

There are also advantages to acquiring a standard (fixed-frequency) VGA monitor. This display system is less complicated than a multisync monitor and therefore costs less to purchase and maintain. But if the possibility exists that you may require the use of extended performance from a "super VGA" video adapter, only a multisync monitor will suffice.

Some general facts about VGA monitors, and video monitors in general, are in order: VGA's increase in displayable colors over digital video is rooted in the performance of the VGA video adapter during digital-to-analog conversion and in the monitor's capability to reproduce 64 levels of intensity in each red, green,

and blue input from the analog signals.

The horizontal scan frequency is the rate at which the electron beam scans the screen horizontally. Higher horizontal scan frequencies basically translate into higher resolution. The vertical scan frequency is the rate at which the electron beam travels toward the bottom of the screen. Higher vertical scan frequencies translate into less image flicker and less visual fatigue.

The bandwidth of a monitor is its capability to accept video information. A monitor with a wide bandwidth can support high horizontal and vertical scan frequencies and, therefore, process more information in a given amount of time to display images in high resolution.

The persistence of the screen phosphors (which coat the inside of the screen), along with vertical scan frequency, also has a bearing on image flicker. Basically, persistence is how long a pixel remains illuminated in a given area of the screen illuminated by the rapidly scanning electron beam. A monitor with long-persistence phosphors is ideal for applications such as CAD, publishing, or business graphics, where the graphics are relatively static. A monitor with short-persistence phosphors is ideal for word processing and animated graphics. Using a monitor with long-persistence phosphors for word processing would result in annoying ghost images or smears as the text moves. This was common in the old green-screen IBM PC XT monochrome monitors. Analog monitors with long-persistence phosphors are not common as analog monitors with short-persistence phosphors. Many vendors find that a medium-persistence phosphor coating can please most of the people most of the time.

Dot pitch is the distance (gap) between pixels in a raster dot. The smaller the dot pitch, the better the screen resolution will

How We Tested 14-Inch VGA (Analog) Monitors

Using a Compaq 386/20 in the InfoWorld Test Center, we connected each of the nine VGA monitors with a Paradise Professional VGA Card. This card is capable of driving analog monitors up to a resolution of 640 by 480 in 256 colors, or 800 by 600 (Super VGA) for multisync monitors. We used a variety of popular software packages to evaluate the images produced on these monitors, including AutoCAD, Spillix, Word, and WordPerfect. Word (in both text and graphics modes), as well as our own video test program that displays various color palettes and modes.

We surveyed 1,000 InfoWorld readers who are involved with monitors in their organization, asking them what VGA monitors they have or are interested in purchasing. About 50 percent of the respondents were men and to what degree. The results of this survey were used to establish testing and scoring criteria, and contributed to the weights given to various report card categories.

Of the more than 40 monitor manufacturers listed in our survey, nine 14-inch models (the size readers were most interested in) were chosen for this Product Comparison. This was based on percentages. The monitor vendors that readers indicated they were the most interested in reading about, or whose monitors they had, were given top priority.

PERFORMANCE:

Two tests comprise our performance section: image definition and color duplication. All of the monitors were displayed simultaneously, and a team of judges from the InfoWorld Test Center and editorial staff observed and scored output results on each of the monitors using the various software packages. The results were then compiled into scores.

Image definition: This rates the clarity and precision of the display image. One of the most telling tests was

the Microsoft Word test because of the intricate nature of text output; we ran Word output in both text and graphics modes. We especially looked for factors such as fuzzy output, halos around graphics, and differences between output definition depending on its location on the screen. (For instance, some monitors have much more blurry definition as it reaches the screen's edge.) A fine dot pitch such as that of the Sony or the Mitsubishi can be an excellent definition.

Color duplication: This scores how capably and faithfully the monitor reproduces color. We watched for washed-out colors and colors that seemed to contain other colors (such as too much red in a yellow, which can create a goldish-color) or that were not "true," and backgrounds that were dark and that did not interfere with screen output. The very black backgrounds typically permitted the best color output because of the optimized contrast.

DOCUMENTATION:

This score reflects the quantity and quality of written information. At a minimum, documentation should describe the product completely and how to use it up and use it. The score can be enhanced by a quick-start guide, a quick-reference card, pin-out diagrams (matching display signals to connection pins), clear illustrations or diagrams, or troubleshooting sections. Poor organization, missing information, or an incomplete index lower the score.

SETUP:

We do not score setup for monitors since it typically could not be simpler. Any potential setup issue such as inaccessibility of controls is addressed under ease of use.

EASE OF USE:

Ease of use is, in large part, a function of the product's design, and evaluates how easy the average user would

find the monitor in typical daily use. Using the control panels (and accessing them), changing parameters, how effectively the tilt-and-swivel stand works, screen glare, ease of adjustments, and other use factors can add to or detract from a score.

SUPPORT:

Support is divided into three areas: workmanship, support policies, and technical support. Workmanship evaluates how well a monitor is constructed, both inside and out. We looked at circuit boards with an eye for loose parts, obvious last-minute fixes, sloppy soldering, and other deficiencies. Products with a heavy-duty design, clearly built to withstand a lot of use, typically receive higher scores.

For a satisfactory score in support policies, we require a standard one-year warranty with unlimited, but not toll-free, telephone support. Bonuses are awarded for money-back guarantees, corporate or extended support, bulletin board support (e.g., CompuServe), a toll-free number, and extended warranties. We reduce the score if support is only available through letters, since this is the best use of support.

For a satisfactory score in technical support, we must be able to easily get through to courteous, knowledgeable technical support personnel twice. We call anonymously, posing as average users of the monitor. Products get higher scores if we reach staff members with in-depth product knowledge or support that goes above and beyond the call of duty, such as suggesting work-arounds to problems, sending fixes, or other extras. Busy signals, being put on hold for long periods, and callbacks can detract from a score.

VALUE:

Value scores reflect the price vs. the performance and features of each product tested, taking into account the competition.

appear to be. A 14-inch (diagonal) monitor with about a 10-by-8-inch display can easily resolve an image up to 800-by-600 pixels if it has a dot pitch of .31mm or less.

In this Product Comparison, we look at nine 14-inch VGA monitors. While scores differ, all of the monitors are very nice offerings and performed well overall. They all provide display output superior to an EGA monitor. VGA is gaining in popularity and is expanding its user base quickly, and it already has a large user base in publishing, business graphics, art, and CAD. VGA will undoubtedly be the dominant video standard for IBM PCs in the future.

Amdek Monitor/632

ANALOG MONITOR

The Amdek Monitor/632 is a compact analog display device with an etched screen and a bright color palette. It comes standard with a tilt-and-swivel base and control switches that are conveniently located on the front panel.

It is designed to compete directly with the IBM 8512 monitor (also included in this review). Amdek also manufactures a multisync monitor (not reviewed here), the Amdek 735 Smartscan, which has a finer dot pitch (.31mm).

Image quality on this machine is affected by its .39mm dot pitch, which was not as fine as some of the systems we tested. Text displayed in Microsoft Word appeared fuzzy and became more difficult to read when we switched from text to graphics mode. Edges of color squares in Autoshade output also appeared fuzzy, and there was a "halo" effect around some squares. Although we found clearer images with fairly good line definition when we ran Splash, overall we cannot rate image definition higher than satisfactory.

Amdek made up for its text clarity problems with good color duplication. Although clarity was still a problem, color contrasts in our test output were good. White was paper-white, and we were only disappointed with the yellow, which had a noticeable green tint. Amdek's color duplication earns a good score.

PRODUCT SUMMARY



Amdek Monitor/632

Company: Amdek Corp., 3471 N. First St., San Jose, CA 95134; (800) PC-AMDEK.

List Price: \$595.

Pros: Clear, vibrant colors; convenient control layout; unlimited technical support.

Cons: Fuzzy text display; screen somewhat gray.

Summary: This monitor combines a low price with a bright color palette; text display quality could be improved.

Documentation for the Amdek consists of a short, pocket-size booklet with instructions for cable and power connection, a description of front-panel controls, and monitor specifications. Diagrams of the front and back panels illustrate setup and use instructions, although three picture-adjustment controls were not described. You get the basic information you need to install the monitor but little else. We rate documentation satisfactory.

As mentioned, power, contrast, and brightness controls are on the front panel; vertical and horizontal adjustments are on the back, and the standard tilt-and-swivel base helps for positioning. Although Amdek's screen is etched to reduce glare, we found more glare with this monitor than with the others we tested. Otherwise good, this limits our ease-of-use score to satisfactory.

The monitor's internal layout is somewhat crowded, and the metal case must be removed before any adjustments other than the vertical or horizontal holds can be made. On the back of one board, we found a resistor on the end of a jumper, a stray capacitor, and spilled resin. Overall, we cannot rate workmanship higher than satisfactory.

Amdek offers a one-year warranty for parts and labor, and repairs are handled through Amdek service centers. Technical support is unlimited. We rate support policies satisfactory.

We received friendly and knowledgeable assistance when we called Amdek's technical support line. When we spoke to Amdek personnel, they knew the product completely and offered very thorough answers to our questions. We rate technical support very good.

With a \$595 price tag, the Amdek 632 is one of the least-expensive monitors we tested. However, you may pay the price in fuzzier images and screen glare. Overall, we rate value satisfactory.

Compaq Video Graphics

ANALOG MONITOR

Compaq's color analog monitor offers no surprises. Its maximum resolution of 640

by 480 echoes industry standards, and a dot pitch of .31mm produced acceptable results. While its 36-pound weight may approach the mass of some of the other monitors we looked at, the Compaq's design is far less bulky. Like most others, the Compaq rests on a standard tilt-and-swivel base.

We found image quality of the Compaq monitor adequate but not spectacular. Microsoft Word 4.0 produced text that was very crisp and clear in text mode, but in graphics mode the letters were not as well-defined as we would have liked. Overall, we rate image definition good.

This monitor did not display the variation in color tones some of the other monitors sported. The blacks weren't as rich and dense as the blacks on the Zenith, and the whites had a very blue hue and lacked brilliancy. The colors from our Autoshade file looked washed-out and weren't bright. In general, the monitor tended to show too much white in images (a common side effect of a screen that is a light shade of gray instead of black). The slight gradient, also, was distinct on the Zenith or Sony monitors. Brown had more orange, and yellow appeared in gold. While it could have been worse and was acceptable, we must limit the Compaq monitor's color duplication score to satisfactory.

Compaq provides a single booklet covering both the analog and monochrome Video Graphics Monitor. This booklet contains all the basics, a list of controls, step-by-step installation instructions, detailed specifications, and lots of photographs. The addition of a troubleshooting chart would be a useful addition. We rate documentation good.

The power switch, brightness, and contrast controls are easily accessible on the front of the monitor. All are clearly labeled, and the picture controls offer a sufficient range of adjustment. The Compaq tilt-and-swivel base was a little stiffer than others but functional. Also, the anti-glare screen coating was as effective at reducing glare as many other monitors in this comparison. We rate ease of use satisfactory.

The clean design and construction of this monitor was refreshing. Internally reinforced by metal caging on three sides, this monitor felt and looked solid. The only reservation we had was minor: The internal adjustments were in a somewhat awkward location, underneath the picture tube. We rate workmanship good.

Compaq backs this unit with a one-year warranty. Service is available through authorized dealers only. Technical support, likewise, is available only from your dealer. As a result, we rate support policies poor.

We contacted several Compaq dealers and found technical support to be adequate. One technician wasn't immediately able to answer a simple question but called back with the answer. While our results were generally satisfactory, Info-World policy limits dealer-only technical support to a score of poor.

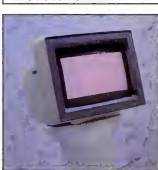
At \$699, the Compaq is an average monitor with an average price. While we found nothing wrong with this monitor's performance, it performed no better than several other monitors in the group. Overall, we cannot rate value higher than satisfactory.

IBM Personal System/2 Display

ANALOG MONITOR

The IBM Personal System/2 Display monitor offers acceptable, though unspectacular, performance. It has large,

PRODUCT SUMMARY



IBM PS/2 Color Display Model 8512

Company: IBM Corp., 1133 Westchester Ave., White Plains, NY 10604; (800) IBM-2468.

List Price: \$623.

Pros: Inexpensive; strong documentation; easy-to-use controls; well-done workmanship.

Cons: Blacks appear washed out; dot pitch not as fine as competitors; tilt-and-swivel stand optional; dealer-only support.

Summary: An average performer with an inexpensive price, the IBM VGA display lacks some advantages of its competitors.

easy-to-use controls, but unfortunately the tilt-and-swivel base is only an option. An additional reason this monitor is manufactured by IBM by third-party hardware developers.

When we began running programs, we quickly noticed that IBM's 41mm dot pitch affected image quality. Individual pixels on the IBM monitor looked much coarser than on other monitors tested, and text had a light blue, rather than white, appearance. A dull gray background and poor contrast between the background and text also gave letters a fuzzy appearance. However, lettering was clearer in text mode than in graphics mode, and image quality in our Autoshade and Splash files was relatively good. This helped display quality, and we rate image definition satisfactory overall.

IBM's color palette looked similar to that of the Tatung monitor; however, colors were less brilliant, and the black background, not as dense or as clear, appeared washed-out. Although colors weren't brilliant, there were rich browns and reds, and lemon-yellows. White was more of a light blue than a paper-white, holding color duplication to a satisfactory score.

Documentation consists of a small book with setup instructions and descriptions of controls and switches. Several clear, simple diagrams illustrate the text, making installation and adjustment instructions easy to follow. Documentation also includes a troubleshooting section, instructions for installing the optional tilt-and-swivel base, and a table of contents. Although there were no comparisons, documentation is more thorough than for some of the other monitors. We rate documentation very good.

Power, brightness, and contrast controls are on side panels; knobs are large and easy to turn. An etched screen helps in eliminating glare, which was minimal. We rate ease of use good.

When we removed the case cover, we found the IBM, like the Tatung, uses a Hitachi picture tube. This varies, however, as IBM uses several manufacturers for

PRODUCT SUMMARY



Compaq Video Graphics Color Monitor

Company: Compaq Computer Corp., 20555 SH 249, P.O. Box 692000, Houston, TX 77269; (800) 231-0900 to locate your nearest dealer; (713) 370-0670 for customer relations.

List Price: \$699.

Pros: Accessible controls; solid workmanship.

Cons: Too much screen glare; dealer-only support.

Summary: Fairly priced, this VGA monitor from Compaq performs adequately overall.

the same monitor. Overall interior case design was also similar, except that the IBM was encased in layers of metal panels. This very sturdy reinforcement helps boost workmanship to a very good score.

IBM offers a one-year warranty on its monitor; an extended warranty is also available. Repairs can be handled on-site. However, because technical support can be obtained only through dealers, support policies are rated poor.

We received friendly and knowledgeable assistance when we called IBM dealers for technical support. But again, because technical support is limited to dealers and can consequently be unpredictable, we must rate technical support poor.

The IBM Personal System/2 Display is expensive with a price tag of \$623. While affordable, this monitor has a dot pitch that is not as fine as other 14-inch VGA monitors, and it would be nice if IBM would throw in the tilt-and-swivel base. We rate value satisfactory.

Mitsubishi Color Monitor XC1429C

ANALOG MONITOR

Mitsubishi's entry into the analog monitor market performs well and offers most of the basics. A maximum resolution of 640 by 480 and a .28mm dot pitch combine to provide nice displays. Weighing only 26 pounds, this monitor is much

easier to handle than some of its heavyweight competitors.

The Mitsubishi monitor looked great when it came to text quality. In text mode, Microsoft Word 4.0 produced good crisp letters, and there was a visible separation between the lines around the outside of the screen. When Word was switched to graphics mode, the monitor only seemed to look better. The text was easy to read and in very sharp focus. We rate image definition excellent.

On the whole, the Mitsubishi showed impressive color fidelity, although we had a couple of very minor problems: The yellows tended to be a little too gold, and some images had a slight pink overtone. Unfortunately, we couldn't get many pictures bright enough to enjoy extraordi-

nary colors, due in part to the very gray-toned screen. We rate color duplication good.

The user's guide provided with this monitor adequately describes all controls and installation. It includes a variety of specifications, and there is an illustrated chart for troubleshooting input-signal problems. A simple discussion of how to properly adjust user controls as well as pin-outs would have made the manual even more thorough. Overall, we rate documentation good.

The power, brightness, and contrast controls are located on the front of the monitor. Additionally, the vertical height, hold, linearity, and centering calibrations are easily accessible through back-panel openings. The tinted screen

FEATURES

14-Inch VGA (Analog) Monitors

	Amdisk Monitor/632	Compaq Video Graphics Color Monitor	IBM PS/2 Color Display Model 8512	Mitsubishi XC1429C	NEC MultiSync 2A	Seiko Instruments CM-1430	Sony CPD-1320	Tatung CM-1496	Zenith Flat Technology ZCM-1490-2
Dot/aperture pitch	.39	.31	.41	.28	.31	.26	.25	.31	.28
Effective display area (inches)	10.8x8	n/a	9.6x7.2	10.9x8.1	11x8.1 ¹	10.5x7.9	10.8x7.9	9.5x7.1	11x8
Active display area (inches)	9.5x7	n/a	9.4x7.0	9.4x7.1	9.5x7.1	9.4x7.1	9.4x7.1	9.5x7.1	9.8x7.1
Maximum resolution (graphics mode)	640x480	640x480	640x480	640x480	800x600	1024x768	800x600 ²	640x480	640x480
Maximum refresh rate (scanning frequency) (KHz (Hz) by Hz (V))	31.5x70	31.5x60/70	31.5x70	31.5x60/70	35x56	31.5x70	31.5x60/70	31.5x50/60/70	31.5x70
Signal inputs matched with IBM PS/2	Yes	n/a	native	Yes	Yes	Yes	Yes	Yes	Yes
Monitor weight (lbs.)	29	36	30	26	31	40	30	28	40
Tilt-and-swivel stand standard	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes
Dimensions (WxDxH; w/o stand)	14.0x14.6 x12.1	13.8x14.5 x14.1	14.0x15.5 x12.0	13.9x15.4 x12.3	14.0x16.0 x12.6	14.2x17.4 x11.7	13.7x16.2 x12.8	14.4x15.8 x12.5	14.8x15.5 x12.3

¹Area inside of bezel.

²The Sony CPD-1320 has a tube specification resolution of 800 by 600; however, the performance specification is 640 by 480.

REPORT CARD

14-Inch VGA (Analog) Monitors

	(InfoWorld weighting)	(Your weighting)	Amdisk Monitor/632	Compaq Video Graphics Color Monitor	IBM PS/2 Color Display Model 8512	Mitsubishi XC1429C	NEC MultiSync 2A	Seiko Instruments CM-1430	Sony CPD-1320	Tatung CM-1496	Zenith Flat Technology ZCM-1490-2
Price			\$595	\$699	\$623	\$685	\$799	\$995	\$695	\$685	\$999
Performance											
Image definition	(225)	()	Satisfactory	Good	Satisfactory	Excellent	Good	Excellent	Excellent	Very Good	Satisfactory
Color duplication	(100)	()	Good	Satisfactory	Satisfactory	Good	Very Good	Very Good	Excellent	Very Good	Excellent
Documentation	(50)	()	Satisfactory	Good	Very Good	Good	Very Good	Poor	Satisfactory	Satisfactory	Very Good
Ease of use	(150)	()	Satisfactory	Satisfactory	Good	Good	Excellent	Satisfactory	Good	Good	Good
Support											
Workmanship	(150)	()	Satisfactory	Good	Very Good	Very Good	Satisfactory	Good	Good	Very Good	Excellent
Support policies	(75)	()	Satisfactory	Poor	Poor	Poor	Very Good	Good	Satisfactory	Satisfactory	Poor
Technical support	(75)	()	Very Good	Poor	Poor	Poor	Very Good	Excellent	Poor	Very Good	Poor
Value	(175)	()	Satisfactory	Satisfactory	Satisfactory	Good	Very Good	Good	Excellent	Good	Good
Final score			8.3	5.1	5.3	6.7	7.2	7.1	7.6	6.7	6.4

Use your own weightings
to calculate your score

GUIDE TO REPORT CARD SCORES

InfoWorld reviews only finished, production versions of products, never beta test versions.

Products receive ratings ranging from unacceptable to excellent in various categories. Scores are derived by multiplying the weighting (in parentheses) of each criterion by its rating, where:

Excellent = 1.0 — Outstanding in all areas.

Very Good = 0.75 — Meets all essential criteria and offers significant advantages.

Good = 0.625 — Meets essential criteria and includes some special features.

Satisfactory = 0.5 — Meets essential criteria.

Poor = 0.25 — Falls short in essential areas.

Unacceptable or N/A = 0.0 — Fails to meet minimum standards or lacks this feature.

Scores are summed, divided by 100, and rounded down to one decimal place to yield the final score out of a maximum possible score of 10 (plus bonus). Products rated within 0.2 points of one another differ little. Weightings represent average relative importance to InfoWorld readers involved in purchasing and using that product category. You can customize the report card to your company's needs by using your own weightings to calculate the final score.

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Date of Residence: Month Year						Monthly Payment: \$				Buy <input type="checkbox"/> Rent <input type="checkbox"/> Other <input type="checkbox"/>	
Previous Address:				Dates of Residence: From To							
Your Employer: (if self-employed, complete section "d.")				Date of Employment: Mo. Yr.		Position:		Monthly Income: Gross \$ Net \$			
Employer's Address: Street		City		State		Business Phone: ()					
Previous Employer:		Address:		Dates of Employment: From To							
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PRODUCT SUMMARY



Mitsubishi XC1429C

Company: Mitsubishi Electronics, 991 Knox St., Torrance, CA 90502; (213) 217-5732.

List Price: \$685.

Pros: Fine dot pitch; lightweight; very fine text quality; nicely made.

Cons: Brightness control could not be adjusted bright enough on the Mitsubishi; tilt-and-swivel base not standard; dealer-only support.

Summary: The Mitsubishi VGA monitor was a midrange performer with gorgeous text output, although it was difficult to brighten the screen.

significantly helped to reduce glare. The tilt-and-swivel base helps for positioning, but it is only an option. Unfortunately, we were constantly confounded by the limited range of the brightness control. Even at its maximum setting, we didn't find the images bright enough. This limited how easy the monitor was to use, and as a result we can rate ease of use no higher than good.

Mitsubishi's clean, two-board design made access to almost anything inside the case a cinch. We found no evidence of

last-minute fixes on this monitor. We rate it very good in workmanship.

Mitsubishi warrants its product for one year. Repairs are handled through service centers or TRW, Technical support is available only through dealers, however, and therefore we can rate support policies no better than poor.

The dealers we spoke with offered adequate technical support, were mostly helpful, and could generally answer our questions. InfoWorld policy, however, dictates that Mitsubishi can rate no better than poor in technical support since it offers none directly to end-users.

Mitsubishi sells a solid product for \$685. Priced in the middle range, it had very nice text output, and overall we rate it a good value.

NEC Multisync 2A

MULTISCANNING ANALOG MONITOR

The NEC multiscanning monitor provides extras not found in simpler analog systems. Boasting a dot pitch of .31mm, the monitor has an adjustable vertical-frequency control, to allow high-resolution VGA cards to drive it at resolutions up to 800 by 600 (known as Super VGA). It also provides an extraordinary range of user controls on the front of the monitor, making adjustments much easier. Weighing only 25 pounds, the NEC is easy to move around.

On the whole, images on the Multisync 2A weren't quite as good as some other monitors, despite the NEC's fine dot pitch. This was particularly noticeable when viewing text in Microsoft Word 4.0, where letters appeared coarse. There was no fuzziness or blurriness to characters, but they did have a distinct grainy appearance. Image definition was still fine enough to earn a good score.

The Multisync 2A does an exceptional job of reproducing colors. The "IBM browns" was rich brown, and reds were

PRODUCT SUMMARY



NEC Multisync 2A

Company: NEC Home Electronics, 1255 Michael Drive, Wood Dale, IL 60191; (312) 860-9500.

List Price: \$799.

Pros: Supports several scanning frequencies; supports 800-by-600 (Super VGA) resolution; convenient location and wide selection of user controls; fine color or duplication; toll-free support.

Cons: Coarse appearance to text.

Summary: Competitively priced for what it offers, the easy-to-use NEC Multisync 2A VGA monitor supports high resolution and adjustable vertical-scanning frequencies.

dense and true. The yellow was the one downfall, appearing to have extra red in it, which resulted in a goldish color. White was very true with no blue visible. The colors were rich and full. We rate color duplication very good.

We were impressed by NEC documentation. It contained descriptions of all switches, monitor adjustments, step-by-step instructions for setup, pin-out and general specifications, troubleshooting

charts, and lots of helpful diagrams. We rate documentation very good.

The power switch is on the front panel, where you can also adjust brightness, contrast, horizontal position, vertical position, and vertical size. NEC has etched the monitor's screen to reduce glare. The extraordinary range of controls available from the front panel earns the Multisync 2A an excellent score in ease of use.

While the monitor's multiple-panel design is well-conceived, workmanship could have been a little better. We found several components soldered directly to one another above the board as well as many jumpers and other last-minute fixes. While these changes don't present serious problems, we cannot give workmanship a score higher than satisfactory.

NEC warrants labor on this machine for one year and all parts for two years. Service is available directly from NEC or through authorized service centers. NEC also offers free technical support on its toll-free consumer electronics line. We rate support policies very good.

We found NEC's support staff to be courteous and knowledgeable about its products. While we weren't always able to get through on the first call, we experienced no serious problems contacting the staff. NEC earns a very good score in technical support.

At \$799, the NEC Multisync 2A is more expensive than many simpler analog monitors. But it is the only one of the group to provide Super VGA, and its displays were very nice in general. We rate it a very good value.

Seiko CM-1430

TRINITRON ANALOG MONITOR

The Seiko monitor provides the same high-quality Trinitron picture as the Sony. While more expensive, it offers a high-resolution, IBM 8514/A mode (see

IBM's Other Analog Video Standards

Along with VGA, IBM has three other analog video standards: PGC, MCGA, and 8514/A. Each has its own niche in the marketplace, and MCGA and 8514/A appeared concurrently with VGA.

When IBM introduced VGA, it wasn't the first time Big Blue had resorted to analog-based video. PGC (Professional Graphics Controller; also referred to as PGA) was introduced in 1984 as a video adapter for CAD work. PGC was the first adapter of its kind for the IBM PC, a true graphics "coprocessor" that actually processed graphics on its own and used an analog interface to the monitor. The PGC provided 640-by-480 resolution in 256 colors from a palette of 4,096 colors.

PGC required the analog Professional Graphics Display. Using its own separate microprocessor and memory, PGC did all graphics processing independently of the host computer system — which meant that the host computer was not taxed during the graphically intensive operations. The host computer passed commands to PGC, which then did the graphics chores. PGC is still on the CAD scene, but it is now greatly overshadowed by graphics coprocessors that come from Matrox, Number Nine, Compaq, and even from IBM itself with the 8514/A.

The 8514/A standard was introduced along with MCGA and VGA but as a separate video adapter for the Micro Channel bus. 8514/A is essentially a super VGA, and provides 640-by-480 resolution in 16 or 256 colors. There is also a high-resolution graphics mode with 1,024-by-768 resolution in 16 or 256 colors. This all comes from a palette of 262,144 colors, and to run in the high-resolution mode you must expand the 8514/A adapter's video memory from 512K to 1 megabyte.

The 8514/A video adapter is not just another "super VGA." Its hardware architecture differs radically from the VGA adapter in that, like PGC, it has a graphics coprocessor. The 8514/A produces non-interlaced video in most modes,

except in high-resolution mode, where it produces interlaced video. Interlaced video, common to television sets, means that for each image or frame you see on-screen, the monitor scans the screen twice (one for even, one for odd lines). At this resolution, a lot of information is being sent to the screen for one image and most systems simply cannot handle all the output in one pass. There are systems that can accommodate a high-resolution image without resorting to interlacing, but they are much more expensive.

When compared to VGA, 8514/A is faster performing the same graphics chores at VGA resolution. IBM will not be releasing an XT- or AT-based version of the 8514/A. It is only available as a Micro Channel product, and there are no true 8514/A clones available. Some industry soothsayers predict the standard of the future will be 8514/A — supplanting VGA. The aftermarket's super VGA adapters can provide the resolution now, but only 8514/A is capable of putting the speed and the resolution together.

IBM's little PS/2 Model 50 didn't come standard with VGA like the Models 50 and 60. It came with MCGA, which is basically a subset of VGA. It has a high-resolution graphics mode of 640 by 480 — like VGA — but only in two colors, not 16. However, MCGA provides 320-by-200 resolution in 16 or 256 colors from a palette of 262,144 colors. It also provides CGA but not EGA compatibility. For the most part, MCGA was a mistake — a VGA teaser. Wisely, no aftermarket manufacturers have cloned MCGA for the XT/AT market, but instead provide compatibility through VGA.

In January of this year, Compaq introduced its Advanced Graphics Color Monitor, a 1,024-by-768 high-resolution color VGA monitor, with the intention of creating a new high-resolution VGA-compatible standard. It has a dot pitch of .29 mm and is not IBM 8514/A-compatible. IBM 8514/A standards — since 8514/A can only work on Micro Channel systems.

— Gary Lee Hendershot

PRODUCT SUMMARY



Seiko Instruments CM-1430

Company: Seiko Instruments USA, PC Product Division, 1144 Ringwood Court, San Jose, CA 95131; (800) 888-0817. List Price: \$995.

Pros: Superior Trinitron technology; supports high-resolution, IBM 8514/A mode; clear text and bright colors; toll-free, unlimited support.

Cons: Hard-to-reach power switch and minimal user controls; expensive if you don't need the extra high-resolution mode; documentation needs improvement.

Summary: Using the same Trinitron technology as the Sony, the Seiko VGA monitor is a strong performer that provides an additional high-resolution mode.

sidebar, "IBM's Other Analog Video Standards," Page 62).

In our tests at resolutions of 640 by 480 and 320 by 200, the Trinitron picture tube had dynamic output (see the following section on the Sony for a discussion of Trinitron technology) using a .26mm aperture grille. In the 8514/A mode, the Seiko can display up to 1,024-by-768 resolution, including 800-by-600 Super VGA resolution (like the NEC). The Seiko includes a tilt-and-swivel base and was one of the larger monitors in our Product Comparison, weighing nearly 40 pounds.

The Seiko and the Sony have very comparable image qualities at similar resolutions. The Microsoft Word 4.0 file looked as good in graphics mode as it did in text mode—both produced very crisp, clear letters. The increased brightness of the graphics mode didn't make the text harder to read, as is common on non-Trinitron tubes. The image was as crisp and clear in the center of the screen as it was in the corners and edges. Image definition earns an excellent score.

The color palette in Lu Autoshade showed colors virtually identical to those on the Sony monitor. "IBM brown" was a solid brown and didn't look orange. The white was not particularly brilliant but was paper-white with no trace of a blue tint. The black was dense and rich, and yellow was good although not quite the neon-yellow color of the Sony. Overall, we rate color duplication very good.

Seiko documentation is basically limited to descriptions of user controls. The booklet contains diagrams for connecting the monitor to the computer, plugging in the power cord, and finding the user controls. There is a detailed section on safety procedures. Completely missing from the documentation was any mention of troubleshooting, monitor specifications, or pin-out diagrams. Not as complete as we think necessary, documentation earns a poor score.

The Seiko provides a minimum in user controls. The vendor says that the monitor contains automatic controls and as a result requires little, if any, user attention. The power switch is located on the back panel, which is a real inconvenience for a monitor this large. The only other control is a brightness knob, thankfully located on the bottom right-hand side of the front panel. The screen itself is smoked with a silica coating to reduce glare without affecting the overall sharpness of the picture. However, the inconvenient location of the power switch prevents this monitor from getting higher than a satisfactory score in ease of use.

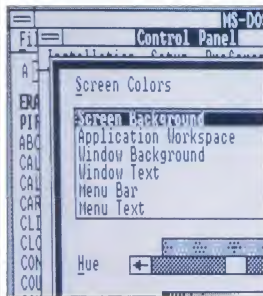
This monitor was well-constructed. A skeletal metal frame housed easily accessible, well-crafted circuit boards. While we did find one stray jumper on the back of a board, this monitor still merits a good workmanship score.

Seiko offers a one-year warranty on its monitor and free technical support on a toll-free line. We rate support policies good.

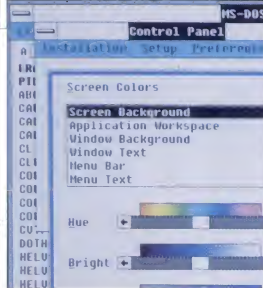
We had no trouble getting through to Seiko for technical support. Staffers took the time to describe underlying limitations of fixed-frequency monitors and were not only knowledgeable but able to clearly describe technical concepts. This accessible and very useful support easily earns an excellent score.

Second only to the Sony in overall quality, this monitor performed very well. If you need the basic resolutions only, the Sony will give you more for your money. However, if you need IBM 8514/A compatibility, paying \$995 for the Seiko monitor may be well worth the price. Because of the added capabilities

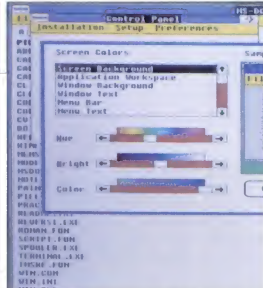
Resolution Makes the Difference for Clarity, Fineness, and Color



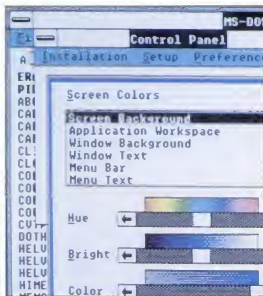
GGA resolution is 320 by 200.



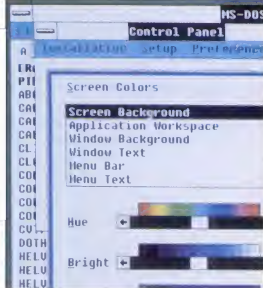
Common VGA display at 640-by-480 resolution.



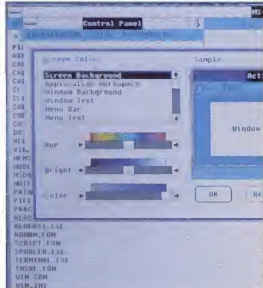
Super VGA mode with 800-by-600 resolution.




GGA display with 640-by-350 resolution.



VGA display at 640-by-480 resolution with 256 colors.



IBM 8514/A display with 1,024-by-768 resolution.



Dan Goulet,
Ph.D., Director,
Academic Computing Services,
University of Wisconsin/Stevens Point.

Jim Leonhart,
AT&T National Account Manager.



Recently, an information management revolution occurred at the University of Wisconsin-Stevens Point. Dan Goulet from the University and Jim Leonhart of AT&T—campus radicals of a different kind—explain how they were able to realize a bold and complex vision.

FEBRUARY 22, 1989

Jim: I remember the first day we met. You had been around the block a few times, but weren't getting the answers you needed.

Dan: *We wanted to create a unique education environment: a free-flowing on-line computer campus. We had a vision, and we were looking for someone to help build it.*

Jim: A distributed networked computing solution, that's what we'd call it now: a way to process, move and manage information effectively, throughout a widespread organization.

Dan: *We talked to many computer vendors before you. We got tired of describing what we needed, so we drew it. That graphic was about 13 feet long.*

Jim: More like twenty. The chart showed every information resource on campus linked together, accessible to students, faculty, and administration. It became the wallpaper in my office for fifteen months.

Dan: *It was like a blueprint for a data superhighway.*

Jim: We put our ISN wide-area network at the center—like an interchange—and built fiber and twisted-pair data lanes to applications running

on AT&T 3B2s, DEC, UNISYS and other hosts located in all the departments. We put on- and off-ramps in strategic locations: StarLAN networks that gave access to the highway from workstations.

Dan: *We designed everything from the user perspective. The more technically remarkable the system became, the harder we worked to make it approachable.*

These men started a revolution on campus.

Jim: Easy for novices, powerful enough for programming students.

Dan: *We developed a menu-driven user interface that is consistent and clear. Students and faculty can select applications like checking spelling, transmitting course grades, even browsing through the on-line card catalog of 1.5 million books at the University of Wisconsin-Madison. We wanted desktop power and access, but we wanted to process information where it made the most sense.*

Jim: Thinking back, we realized early that the complexity of your vision precluded a single-system focus. You needed open systems.

Dan: *You were really the only ones that understood this point. Open systems allow us to use off-the-shelf components; vendors have to bid against each other to get our business. Open systems are the secret.*

Jim: It's mind-boggling how much computer power is out there. We wanted to harness it all, yet give a piece to every individual.

Dan: *A truly distributed network, one we don't think we'll ever outgrow. We've added 300 WGS workstations in the last five months.*

Jim: Dan, where in the world is that wallpaper today?

Dan: *We had it bronzed. Today, so many colleges and businesses really need a similar solution. That's probably why we've had so many visits from them lately.*

Jim: Little did we know back then, when we first met.

Dan: *Oh, something tells me you had a hint.*

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THE CHALLENGE:

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THE SOLUTION:

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THE RESULT:

Stevens Point has been designated a Center of Excellence for Distributed Academic Computing by the Board of Regents for the entire University of Wisconsin system. The majority of the 9000 students on campus regularly use the network for coursework and homework. Faculty have integrated computing into 41% of their coursework.

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and the fine performance, we rate value good.

Sony CPD-1320

TRINITRON ANALOG MONITOR

The Sony monitor with its native Trinitron technology outperforms all of the other monitors in this comparison. Not an especially expensive monitor, the Sony has brilliant, vibrant colors and extremely clear, crisp text.

The Trinitron technology is the main reason this monitor and the Seiko differ from the rest of the monitors in this comparison. The phosphor placed on non-Trinitron monitor screens consists of a triangular series of dots, onto which light is beamed using a metal plate known as a *shadow mask*. Each of the three dots represents a basic color, with each triangle forming one pixel. Instead of the triangle configuration, the Trinitron tube has a phosphor pattern arranged in vertical stripes. Not using a shadow mask but instead an *aperture grille* — made of wires strung across the screen — long, vertical openings permit the passage of electrons. This method lets more electrons from the beam hit the screen, which means the picture will be more brilliant. This technology is used in Trinitron television sets.

The Sony monitor has an aperture grille measuring .25mm. This measurement is roughly comparable to dot pitch (in dot pitch it would be about .22mm), but because of the Trinitron technology, we aren't measuring the distance between dots but the distance between the horizontal grilles. Another design difference is the shape of the tube. Conventional tubes have a spherical surface, whereas Trinitron screens are cylindrical; a Trinitron tube curves only in the horizontal direction as opposed to a conventional tube that is rounded in all directions. The curve of the Trinitron tube tends to reduce both image distortion and glare from overhead light.

VGA Monitors Face-to-Face: From Beautiful to Brilliant



Andek Monitor/632



Compaq Video Graphics Color Monitor



IBM PS/2 Color Display Model 8512



Mitsubishi XC1429C



NEC Multisync 2A



Seiko Instruments CM-1430



Sony CPD-1320



Tatung CM-1496



Zenith Flat Technology ZCM-1490-Z

Text in our Microsoft Word 4.0 file was clear in both text and graphics modes. The lines around the outside of the Word screen were crisp and very well-focused. The screen appeared to have the same clear, crisp focus on the edges of the screen as it did in the center of the screen.

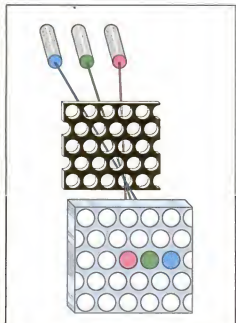
Image definition earns an excellent score.

The color palette on the Sony was, naturally, very similar to the Seiko. The colors were brilliant and had a crisp, clean appearance. The "IBM brown" had a rich brown look, and the reds were dense and had no orange hues. The yellow was

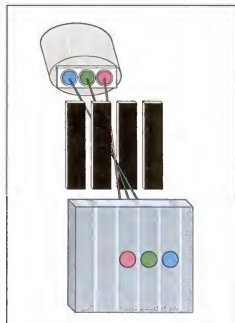
lemon-yellow and better than the Seiko's, with no gold overtones. Flawless performance earns the Sony an excellent in color duplication.

Documentation is comprised of a short booklet that describes all controls and switches as well as how to attach the

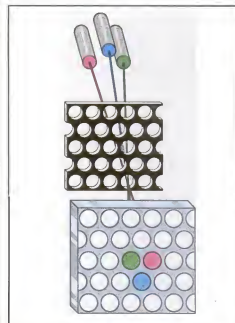
Grilles vs. Masks: Why Sony's Trinitron Looks So Great



A less-common, three-gun alternative to the typical triangular configuration, this horizontal gun and shadow-mask layout helps prevent convergence by shooting electron beams precisely in line.



Sony's Trinitron uses one gun instead of three, which is more accurate. The aperture grille allows a large portion of the beam to pass through, making the image brighter. More expensive, this looks the best.



The common triangular three-gun and shadow-mask arrangement is least expensive, but is often inaccurate and subject to misalignment. Also, this approach requires smaller and more troublesome lenses.

monitor to a computer. There are some very nice diagrams that match the actual hardware and may help a novice user through a first-time installation. Sony provides specifications on the monitor, but there is no troubleshooting section or pin-out diagram. We rate documentation satisfactory.

The Sony includes standard user controls: power, contrast, and brightness. Sizing adjustments are performed automatically. The controls are large enough so they are very easy to operate. The screen is relatively flat, and the glass is smoked. There is very little glare on the screen. Ease of use earns a good score.

The Sony is well-designed. The mostly plastic case houses easily accessible boards, although we found a few last-minute fixes on the back of the main board. Overall, however, we wouldn't expect any problems with this unit's design, and we rate workmanship good.

Sony's warranty is 90 days for labor, one year for parts, and two years for the picture tube. While technical support is primarily offered through dealers you can get support through the main Sony toll-free line, typically used to obtain general information. If you call on this line, you'll have to leave a message and Sony technical support will call you back. While better than no vendor support at all, support is primarily available through dealers, and the main line is frequently busy. We rate support policies satisfactory.

We called numerous times on the Sony toll-free line, and we were only able to get through once; all other times it was busy. The person we spoke to was unable to locate material on the monitor and gave us incorrect information; apparently the only person who knew the monitor was out of the office for a week. Sony offered to call us back the following week. We also called Sony dealers, who were able to adequately answer our questions. Some—not surprisingly, knew the product better than others. While the information we received from dealers was generally satisfactory, the available support tends to be hit-and-miss and we must rate

technical support poor.

Overall, this monitor consistently performed well. Its Trinitron technology enables it to outperform much of the competition. Surprisingly, the Sony monitor is priced in the same range as most simpler analog monitors at only \$695. Getting state-of-the-art performance at a run-of-the-mill price, you can't go wrong with Sony. We rate it an excellent value.

Tatung CM-1496

ANALOG MONITOR

The Tatung Color Display has a fine dot pitch of .31mm and features brilliant

color against a dense black background. A multicolor control switch on the front panel lets you change from normal text (white) to amber, blue, or green text. Standard features include a dark-tint screen and a tilt-and-swivel base.

The Tatung monitor had no difficulty displaying our Microsoft Word file. The graphics mode was almost as clear as the text mode, and there was good background to text contrast. Image quality in our Autoshade and Splash files was good, although borders around the images were not quite as clear as on the IBM monitor, which seemed to be the Tatung's closest competitor. There was a very slight "halo" around some of the color squares

on the Autoshade palette, but overall, image clarity and clear color contrast were better than the dot pitch would indicate and were strong enough to earn the Tatung a very good score in image definition.

Although Tatung's color palette displayed colors identical to the IBM monitor, Tatung's display was more brilliant and clear—not surprising, considering the difference in dot pitch. White was paper-white, and there was good contrast between colors, although there was a slight pink hue to some images. The dense black background contrasted well with the rich color scheme. We rate the Tatung CM-1496's

Tatung super VGA: 1024 x 768 NEC super VGA: oooooooooops!

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FEATURES	NEC Multisync 2A	Our CM-1496X	Our CM-1496L
Max. Res.	800x600	1024x768 ¹	1024x768 ²
CRT Size	14"	14"	14"
Dot Pitch	0.31	0.31	0.28
IBM 8514 ³ Compatible	NO	YES	YES
Sugg. Retail	\$799	\$749	\$799

Maximum Resolution w/Graphic Card (Partial List)			
ATI VGA Wonder™	800x600	1024x768	1024x768
GENOA Super VGA Hi-Res Model 5400™	800x600	1024x768 ⁴	1024x768 ⁵
RENAISSANCE GKS RENOVATION II/256™	800x600	1024x768 ⁶	1024x768 ⁷
STB VGA EM-16™	800x600	1024x768	1024x768
TECHMAR VGA/AD™	800x600	1024x768	1024x768

**Interlaced

PRODUCT SUMMARY



Sony CPD-1320

Company: Sony Corp. of America, Sony Drive, Park Ridge, NJ 07656; (800) 222-SONY.

List Price: \$695.

Pros: Impressive color duplication and image definition; high-quality Trinitron tube; very little glare; inexpensive; easy to use; dealer and (main-line) toll-free support.

Cons: Technical support is difficult to reach.

Summary: The Sony VGA monitor is the leader overall with a Trinitron tube, brilliant colors, impressive display quality, and an attractive price.



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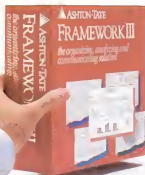
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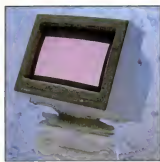
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PRODUCT SUMMARY



Tatum CM-1496

Company: Tatum Company of America Inc., 2650 El Presidio St., Long Beach, CA 90801; (213) 637-2105.
List Price: \$685.

Pros: Fine dot pitch; switchable text colors from front panel; nice color duplication; free technical support.

Cons: None significant.

Summary: With good colors and crisp text, the Tatum VGA monitor is a strong performer and a strong offering overall.

color duplication very good.

Tatum's documentation consists of a very short, four-page handout. Although there is a diagram and a detailed description of the 15-pin cable connector, there are no other diagrams and the instructions for adjusting the monitor are vague. The documentation does include tips for installation, cleaning, and servicing, which earn it a satisfactory score.

The Tatum Color Display has a tilt-and-swivel base, although it is rather stiff. The dark-tint screen helped but did not eliminate glare, which was minimal and fortunately did not affect sharpness. Knobs are large and easy to turn; power, brightness, contrast, horizontal phase, and multicolor control switches are located on the right and left sides of the case. We rate ease of use good.

The internal layout of the Tatum is well-organized. Boards were clean and the power supply was fully enclosed. The Tatum is one of three monitors we found that uses a Hitachi picture tube. We rate workmanship very good.

Tatum offers a one-year parts and labor warranty; repairs are handled by service centers. Tatum offers free technical support. We rate support policies satisfactory.

When we called Tatum's technical support line, we got through immediately. On our first call we reached a technician who didn't know the monitor well but was able to look up an answer to our question. The technician on our second call gave prompt, courteous answers. We rate technical support very good.

The Tatum Color Display monitor combines good image quality with a competitive \$685 price tag. The multicolor text feature is a useful addition. We rate value good.

Zenith ZCM-1490-Z

FLAT-SCREEN ANALOG MONITOR

The Zenith entry into our 14-inch VGA product comparison is a monitor vastly different from the competitors we evaluated. Zenith uses a special flat-screen technology that delivers a beautiful picture, but it comes at a price.

The unique flat-tension mask technol-

"The Zenith flat-screen analog monitor produces some of the most vibrant colors of any monitor in our comparison. It seems to bring to life the picture being displayed."

ogy creates a completely flat screen. This greatly reduces glare because less light gets reflected from the screen, and it gives the monitor an unusually bright image. The flat screen is also intended to eliminate image distortion. The monitor supports the standard VGA resolution of 640 by 480 with a 28mm dot pitch. At 40 pounds, this was the largest monitor we looked at — due especially to the flat-screen technology.

Our Microsoft Word tests produced some out-of-focus and fuzzy text on the outskirts of the screen, and graphics tests produced similar results. Letters were much clearer and in better focus toward the middle of the screen. In the graphics mode, Microsoft Word produced a much clearer picture. We have looked at several flat-screen monitors, and their unique quality has tended to vary a little more than other monitor technologies. This mixed performance limits the Zenith monitor's image definition score to satisfactory.

The Zenith produces some of the most vibrant colors of any monitor in our comparison. This monitor seems to bring to life the picture being displayed, and it handles different shades of a particular color extremely well. The monitor allows you to see excellent detail in the shadows and some amazing color variations. Whites were vibrant and bright, and blacks were solid and dense. Yellow was a pure lemon-yellow, and brown was very true. The red appeared to have just a hint

of orange in it, but was perfectly acceptable. We rate the Zenith's color duplication excellent.

Zenith provides thorough documentation with its monitor. It comes in the form of a small booklet, and all of the essentials are there, with step-by-step installation instructions and a good section on initial monitor settings. The diagrams are useful and match the hardware. There is a complete troubleshooting section with pin-out diagrams, monitor specifications, and a structured symptom cause chart. We rate documentation very good.

Brightness and contrast controls on the top of the Zenith are easy to reach. Unfortunately, the power switch on the rear of this bulky monitor is difficult to get to. Additional adjustments for horizontal and vertical centering and size are accessed through the rear panel, although they require a special tool. The tilt-and-swivel base was remarkably smooth, and you aren't likely to be bothered with glare, since the flat screen is treated with a high-efficiency, antire-

flection coating on both sides of the glass. Limited especially by the awkward location of the power switch and the need for special tools to make adjustments, the Zenith monitor earns a good score in ease of use.

The design and construction of the Zenith monitor were the most impressive of this group. Almost entirely encased in metal, this monitor included a fan and huge heat sinks coming from many of the components. Many components in the Zenith were surface-mounted, a common sight in monitor construction. While the interior of the monitor was cramped with its large tube and numerous boards, we were impressed with the overall design. The Zenith earns an excellent score in workmanship.

There is a one-year parts and labor warranty on the Zenith monitor, but support is handled only through dealers. Corporate support is available. We rate support policies poor, limited by the dealer-only support.

The technicians we spoke with at local Zenith dealers were knowledgeable about the product and able to answer our questions. However, because Zenith does not offer support directly to end-users, we can rate technical support no better than poor.

At \$999, the Zenith is the most expensive monitor we've included in this comparison. But the unit offers a unique flat screen and overall was a very strong performer. While quite expensive, this monitor delivers some unique features, and we rate the Zenith Flat Technology monitor a good value. □

Executive Summary

VGA has become the new standard in monitor technology, and *InfoWorld* readers say that the 14-inch size is their preference. While none of the nine models we tested had any significant performance or ease-of-use problems, there were distinct advantages and disadvantages evident in the group.

The Sony CPD-1320 monitor clearly led the pack in technology and performance for the price. Utilizing the same Trinitron tube system that has garnered such a massive following with its televisions, Sony's VGA monitor has gorgeous display and color quality with minimal screen glare. Priced extremely well at \$695, the monitor's only drawback is that support is too difficult to obtain.

The Seiko Instruments CM-1430 also uses a Trinitron tube and, while it costs \$995, provides a high-resolution super-VGA mode and IBM 8514/A compatibility. Like the Sony, in our tests it had beautiful color duplication and crisp text definition.

Another leader in our evaluation, the NEC MultiSync 2A, is the only VGA monitor of the group that supports multiple vertical-scanning frequencies, making it versatile in offices with a variety of systems. At \$799, you pay for the extra capabilities, but you also get 800-by-600 (super-VGA) resolution, fine color duplication, and conveniently located controls.

Unique to the comparison, the Zenith Flat Technology ZCM-1490-Z VGA monitor uses impressive flat-screen technology and was the most expensive of the group at \$999. While its text tended to blur some at it reached the edge of the screen, it has a fine dot pitch, virtually no glare, and brilliant

color reproduction.

Another strong performer, the Tatum CM-1496 VGA monitor is affordably priced at \$685 and also has a fine dot pitch. Its switchable text and color modes are easily accessed from a front panel, and the text quality and color duplication were impressive.

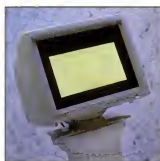
While priced in the midrange at \$689, the Mitsubishi XC1429C VGA monitor will bring a smile to the face of word processing aficionados with its fabulous text output. Our only significant complaint about the Mitsubishi was the difficulty we had in trying to brighten the screen.

Big Blue's entry into the 14-inch VGA monitor race is the IBM Personal System/2 Color Display Model 8512, which did quite well overall, although it had the coarsest dot pitch of the group. Reasonably priced at \$623, it is made well and has easy-to-use controls. Although the display quality could have been a little better, it's not a bad low-end choice.

The Amdel Monitor/633 is a reasonable choice for \$595, and while the dot pitch is not as fine as the Compag monitor, it is a little better than IBM's offering. Yet the text display was fuzzy and the screen was a little glary. If you're not as concerned with text output as with graphics, the clear and vibrant, and the controls are conveniently located.

The Compag Video Graphics Monitor provides a tilt-and-swivel stand (all of the monitors include this item, except for the IBM and the Mitsubishi which only offer them optionally) and a much finer dot pitch than the IBM. Solidly built, our primary complaints with the Compag monitor are too much glare and pale output.

PRODUCT SUMMARY



Zenith Flat Technology ZCM-1490-Z

Company: Zenith Data Systems, 1000 Milwaukee Ave., Glenview, IL 60023; (800) 842-9000.
List Price: \$999.

Pros: Flat-screen technology with very low glare; brilliant colors; fine dot pitch; strong workmanship.

Cons: More expensive than other VGA monitors; heavy; text tended to get blurry towards the outer edge of screen; power switch is hard to reach; dealer-only support.

Summary: A flat-screen monitor with bright colors and fine dot pitch, the Zenith VGA monitor is a strong competitor. The high price is somewhat offset by the unique technology.


FIRST LOOK ■ BY MICHAEL J. MILLER

'Moore's Law' Holds True for New Generation of Processors

Now that Intel has officially unveiled both the 80486 and the 33-MHz 80386, we can step back a bit and ask what it all means.

The bottom line is that "Moore's Law" is alive and well. Moore's Law is Intel cofounder Gordon Moore's 20-year-old prediction that the number of transistors and thus the amount of computing power we'd have on a chip would double every two years. So far, that prediction has held true for each new generation of microprocessors, and it's been borne out again with Intel's 486 and Motorola's recently announced 68040. Both chips have over a million transistors and include features such as memory management, internal RAM caches, and internal math coprocessor capabilities.

None of this came as a great surprise; it's more an evolution than a revolution. In fact, the 486 is primarily going to look just like a superfast 386, one that runs at least another two to three times faster than even a 33-MHz 386 (which itself is about 25 times faster than the original PC and should allow for systems that run nine times faster than those based on the original 6-MHz 286).

The specifics of the chip are impressive. It has nearly 1.2 million transistors and is largely a RISC-based chip, performing many frequently used computer instructions within a single clock cycle. Yet Intel says the chip is completely compatible with the 386, with the functional equivalent of a 386 taking up about 15 percent of the chip area. Like the 386, it's a 32-bit chip capable of addressing up to 4 gigabytes of memory and uses an internal memory management unit. The 486 also integrates the functions of a 387 math coprocessor, which should run even faster since it's integrated into the CPU, as well as an internal cache controller and an 8K on-chip cache. This cache places the most frequently used information within the chip itself, where it can be retrieved much faster—up to 16 bytes of code in a single clock cycle—than from any other type of memory. The chip will automatically use the cache; software applications don't need to be modified.

Just as important as what the 486 adds is what it doesn't change. Unlike the 386, it doesn't add many new features that software developers have to worry about. Intel really didn't have much choice in this; we're only just now beginning to see applications that really take advantage of the 386, and it doesn't make sense to add features that can't possibly be used. Actually, the 486 does have some minor changes that might affect developers of system software and languages. Since different instructions are speeded up at different rates, some compilers might be capable of executing somewhat better performance if they were optimized for the 486; and the 486 does have six new instructions, mostly of use to operating system developers. But these are minor variations; in general, this chip is designed to run the same software as the 386.

As a result, Microsoft chairman Bill Gates said at the introduction, "The system software will finally catch up to the hardware." To that end, he discussed the 386-specific version of OS/2 (which

he said would reach end-users next year) and demonstrated a version of Windows/386 with support for protected-mode applications, so the code for individual Windows applications would no longer be constrained within the 640K of conventional memory. Unfortunately, when I asked him whether the new version of Windows would be able to run other protected-mode applications, such as Paradox 386 and 1-2-3, Release 3.0, he

said it will run DOS applications and Windows applications but not other protected-mode applications.

That's too bad, because it means users will have to know which applications use protected mode and choose between them and Windows 386. It would have been easier if processors had been able to support the VCP1 standard that the other developers of DOS extenders and 386 memory managers have agreed to, so they

would all be able to coexist.

If Moore's Law continues to hold, we'll have larger and larger processors every few years for the foreseeable future. Just think, 10 years from now we could see a chip with 100 million transistors. Of course, this only reinforces the need for new software that takes advantage of these processors. We don't really need 100-MIPS machines if all they do is run 1-2-3.

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IMPRESSIONS

Autocad for the Macintosh Maintains Familiar DOS Look and Feel

Long awaited by myriad users, Autodesk has finally released Autocad for the Macintosh. The packaging and manuals look identical to the DOS version, and the main manual and supplemental guides are the same as for the DOS product. They even contain references to DOS style subdirectories and extended memory management.

Autodesk supplies a nice installation program, which put me in command of

the program very quickly. Double clicking on the Autocad icon culled a main menu that at first glance appeared to be a new style for the Macintosh. Firing up the editor using one of the supplied drawing files produced a real surprise: The old familiar DOS Autocad edit screen is still there, now on the Macintosh. No retraining will be necessary for old Autocad users switching to a Macintosh.

The package has the response and feel

of Autocad on a fast 16-MHz 386 PC. Autodesk's implementation of the vast array of peripheral devices is smaller than what the IBM version boasts but is still quite respectable. Large color displays and dual displays are supported. It does not have the large number of overlay files common to DOS packages, and Autocad accesses the disk a lot less during program operation but needs at least 4 megabytes and a Mac II to operate.

I transferred some favorite DOS drawing files to the Mac and discovered that Autodesk meant what it said about drawing files being transportable between different systems. The files appeared without any modifications being needed.

Autodesk has transferred its popular technology to the Mac very well. At \$3,000, it will be the program of choice for Mac CAD shops or especially for shops that have both Macs and PCs.

Autodesk Inc., 2320 Marinship Way, Sausalito, CA 94965; (415) 332-2344.

—David Chalmers

PC Crash Course And Survival Guide

SCANDINAVIAN PC SYSTEMS

Recently, I was looking for a good DOS tutorial for an associate unfamiliar with computers. I settled on a tutorial disk, but I wasn't very happy; it seemed to be the best of a mediocre bunch. I gave it to him anyway, but it wasn't much of a hit.

Then I found *PC Crash Course and Survival Guide*. This is a book and disk combination that teaches "the least you must know to buy and use IBM PC, XT, AT, and PS/2 computers plus all compatibles." It is directed to the novice, even someone who has never touched a computer.

The *PC Crash Course and Survival Guide* is an excellent guide into the seeming jungle of PC computer use. It includes an exercise disk containing a calculation program, a test to help you determine how much you learn from the book, and a game called Caveman.

Although not a novice myself, I'm not a "techie," either, and I actually learned

"This book and disk teach the 'least you must know.'"

quite a bit. The book is written in a light, humorous manner and entertained me, which always enhances learning. While the writer, Peter Harrison, doesn't patronize his readers, he de-emphasizes the technical jargon and terminology you often find in such a book.

Some of the general areas covered include a description of the PC, how to start the computer and begin using it, copying and deleting files, floppy and hard disk use, and "how to sound like a techie." There are also discussions of various types of common applications, such as spreadsheets, desktop publishing, and communications.

If you're looking for a detailed guide to DOS or a technical reference for the PC, this book is not a solution. It is designed for rank beginners, and at \$19.95, the *PC Crash Course and Survival Guide* is an inexpensive introduction to the IBM PC. The price is scheduled to be increased soon to \$19.95 for the book alone and \$5 extra for the disk (if you buy the book).

Scandinavian PC Systems Inc., 51 Monroe St., Suite 1101, Rockville, MD 20850; (800) 288-SCAN.

—Harriet Darling



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REVIEWS

With the introduction of the small-footprint Macintosh IIcx, Apple has plugged price and size gaps between its desk-hog Mac II and IIx and the compact SE line.

In general, the Mac IIcx is a slimmed-down version of the Mac IIx. It is 19 inches wide, compared to 18.6 inches for the Mac II and IIx systems. To accomplish this shrinkage, Apple eliminated three of the six Nubus slots found in the original systems. Although it took considerable redesign work to fit everything else into the smaller chassis, all of the other features found in the Mac IIx are intact on the IIcx.

FEATURES:

As the third member of the Macintosh 68030 family, the Mac IIcx has a great deal in common with its siblings. All of these machines are powered by the same 15.7-MHz Motorola 68030 processor and by the same 68882 math coprocessor. Other common features among the products include room for up to 8 megabytes of memory (using 1-megabyte chips on standard SIMM panels), a built-in high-density floppy drive that reads and writes all popular disk formats, and the standard assortment of Apple Macintosh external ports.

The same ROMs are included in the IIcx but instead of being installed in the available ROM SIMM slot, they are soldered onto the logic board. This tells us that the SIMM slot is for future upgrades, and it can be enabled by moving a jumper on the logic board.

The three Nubus slots are identical to the six slots found in the Mac II and IIx systems. One slot is required for a monitor; this leaves you with two available slots, which is only one more slot than the SE/30 offers (the SE/30's slot is not a Nubus slot, however). We suggest that you think of the IIcx as a two-slot system.

The IIcx has a larger and better-positioned speaker, so it is capable of producing far better sound. There is a power-on switch on the back of the IIcx that can be locked in the On position. This is useful if you have an unattended system that you want to restart automatically after a power outage. The power-on signal now comes from the power supply instead of the battery. Not only does this save on the battery, it also lets you boot a system with a dead battery.

The fuses that protect the logic board will now reset themselves if they are blown. This means that the logic board may not have to be replaced if a fuse is blown.

Revision 6.0.3 of the Macintosh operating system was shipped with our Mac IIcx. This is the same system software that we received with the SE/30. It includes several fine utilities along with Multifinder, Macro Maker, and HyperCard at no extra cost.

(We reviewed the Macintosh SE/30 March 27, Page 71, and the Macintosh IIx February 6, Page 70.)



The Apple Macintosh IIcx matches the performance of the Mac IIx, making it 1½ times as fast as the Mac II and 5½ times as fast as a 6-MHz IBM PC AT.

The Mac IIcx Saves Space And Offers Most IIx Features

At a cheaper price and with excellent speed and A/UX capability, the IIcx is a very good value.

By DOUG AND DENISE GREEN REVIEW BOARD

PERFORMANCE:

The results of our tests show that the 68030 CPU in the Mac IIcx, with its built-in PMMU, 68882 coprocessor, and 256-byte data and instruction caches, matches the performance of the Mac IIx. This makes it about 1½ times as fast as the Mac II and 5½ times as fast as the 6-MHz IBM PC AT used as InfoWorld's standard of comparison.

The Mac IIcx's CPU speed earns an excellent rating.

Our tests involving applications confirmed the fact that the IIcx performs as well as a Mac IIx. In all cases it outperformed our Mac II. The degree of performance increase varied from a little over 10 percent for disk-based sorting to almost 100 percent for calculations that directly accessed the 68882 chip.

For applications that rely on redrawing or scrolling, the increase in performance with the Mac IIcx was in the 20-to-50 percent range, depending on the product.

The Mac IIcx matched up well against the SE/30 with two exceptions. The SE/30 was faster at drawing complex trigonometric graphs, perhaps because of the different video mode and the smaller monitor. The IIcx was much faster, however, when asked to scroll through an Aldus Freehand 2.0 document; according

to Aldus, this speed is due to processing done by the monitor interface card on the IIcx.

Our performance test results for the 80-megabyte drive on the IIcx were the same as those recorded for the 80-megabyte system on the Mac IIx and the 40-megabyte system on the Mac II.

While the FDHD drive (floppy drive, high density) is no faster in 800K mode than the 800K floppy drive found in the Mac II, when we used 1.44-megabyte disks, we found reads and writes to be almost 1½ times faster.

During this review, we tested all of the best-selling Macintosh applications and desk accessories. In each case, they worked as expected. The best advice here is to keep your software up to date.

Unlike the SE/30, A/UX is supported for the IIcx.

We could not test a wide variety of Nubus cards on the IIcx, but we did receive a warning from Apple. As you would expect, the capacitance of a six-slot Nubus is not the same as a three-slot Nubus. This means that cards that rely on a specific capacitance might not work too well. The example we were given related to revisions J and earlier of Apple's Ethernet card. Be sure to discuss this issue with your vendor before you assume that a given card is compatible on your

IIcx. Also, the power supply in the Mac IIcx is smaller.

Typical IIcx systems will come with 4 megabytes of RAM that can be upgraded to 8 megabytes with the addition of four 1-megabyte SIMMs.

In addition to the three Nubus slots in the Mac IIcx, other expansion options are available thanks to the SCSI port, two serial ports, and two Apple desktop bus slots.

The smaller size of the IIcx prevents it

REPORT CARD INFO WORLD

HIGH-PERFORMANCE COMPUTER

Apple Macintosh IIcx

Criteria	(Weighting)	Score
Performance		
Speed	(400)	Excellent
Expandability	(125)	Very Good
Documentation		
Setup	(50)	Very Good
Ease of use		
Serviceability	(50)	Excellent
Workmanship	(50)	Excellent
Support policies	(50)	Unacceptable
Technical support	(100)	Poor
Value	(125)	Very Good
Final score		7.8

PRODUCT SUMMARY

Company: Apple Computer Inc., 20525 Mariani Ave., Cupertino, CA 95014; (408) 996-1010, (800) 538-9696.

List Price: \$7,069 with 4 megabytes of RAM; 80-megabyte hard disk; FDHD floppy drive.

Features: 15.7-MHz 68030 CPU; three Nubus slots; 68882 math coprocessor; two desktop buses; one SCSI, two serial ports; sound jack.

Peripherals: Extended keyboard (\$229) or regular keyboard (\$129) and mouse (included); no monitor or graphics card.

Storage and Memory: 80-megabyte hard disk (maximum); 1.44-megabyte 3½-inch floppy that reads Macintosh, Apple II ProDOS, MS-DOS, and OS/2 disks; 4 megabytes of RAM expandable to 8 megabytes.

Support: 90-day warranty.

Pros: Increased CPU speed; the capability to run Macintosh or A/UX operating systems; built-in memory management for A/UX; floppy drive reads all popular disk formats.

Cons: Can't hold larger than 80-megabyte hard drive; short warranty; dealer-only support.

Summary: Offers enhanced performance, more value for your money than a Mac II.

ALSO IN THIS SECTION

Packrat, Version 2.0	76
Ask Sam, Version 4.1	78
Review Responses	86
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Headline Rivalry Heats Up

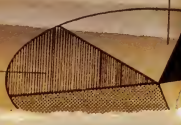
Products are not enough if software products are not displayed in computer stores.

Things are getting down and dirty, a computer analyst observes.

...who have seen what will be...

The Spreadsheet Market

OTHER 6.1%



RACE OF VS. POS

We Interrupt The War For This Im

To all those unlucky enough to be stuck smack in the middle of the current spreadsheet confusion, take heart.

There is, at last, a viable alternative to war: revolution.

One that delivers even more performance than you have (ahem) been waiting for, but without demanding expensive new hardware or extensive retraining. And without abruptly cutting you off from any user in your company, even those on mainframes.

The name of the spreadsheet is SuperCalc® 5.

And what it can do for you is, frankly, quite revolutionary.

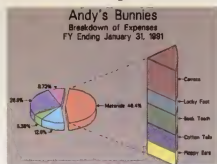
Let's begin at the end. Stand-alone quality graphic capabilities have been built in.

Offering hundreds of presentation treatments from word charts to three-dimensional bar, pie, scatter, and polar graphs.

And with SuperCalc5, you select fonts, lines, boxes, grids and shading. All of which can be used to produce the highest quality customized reports.

Plus, SuperCalc5 actually makes productivity easier. An integrated Undo feature simply reverses unwanted commands. And a truly comprehensive system of debugging highlights costly errors and analyzes macro logic.

Perhaps even more impressive



Present a state-of-the-art picture of your work.

	North	South	East	West	Total
Jan	100,000	100,000	100,000	100,000	400,000
Feb	100,000	100,000	100,000	100,000	400,000
Mar	100,000	100,000	100,000	100,000	400,000
Apr	100,000	100,000	100,000	100,000	400,000
May	100,000	100,000	100,000	100,000	400,000
Jun	100,000	100,000	100,000	100,000	400,000
Jul	100,000	100,000	100,000	100,000	400,000
Aug	100,000	100,000	100,000	100,000	400,000
Sep	100,000	100,000	100,000	100,000	400,000
Oct	100,000	100,000	100,000	100,000	400,000
Nov	100,000	100,000	100,000	100,000	400,000
Dec	100,000	100,000	100,000	100,000	400,000
Total	1,200,000	1,200,000	1,200,000	1,200,000	4,800,000

Link just about everything in sight.



Catch bugs before they come back to bite you.

POWER TION

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personal computer spreadsheet software, a

New program es to fend off spreadsheet war

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January 28, 1989

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The Spreadsheet Important Update.

to be precise. Linking either in memory or on disk, either pages of the same spreadsheet or independent, either SuperCalc5's files or Lotus® 1-2-3®'s.

Which brings us to the "L" word. SuperCalc5 not only reads and writes Lotus® 1-2-3® files, it totally coexists with Lotus.

and compatible computers but also takes full advantage of 286 and 386 machines when you decide to make that transition.

And if all that isn't enough to make you run out today and join the revolution, there's even more incentive.

Like our free demo disk offer through July 31, 1989. And our \$100 upgrade offer for just about any spreadsheet you're using. Call 1-800-531-5236. In Canada call 1-800-663-6904.

Which finally brings us to our admittedly biased outlook for the much touted spreadsheet war.

With SuperCalc5, peace is at hand.

Andy's Bunnies
Income Statement
FY Ending January 31, 1989
(Unaudited)

Revenue		
Sales	\$1,775,423	\$1,775,423
License	\$1,444,775	\$1,444,775
State Operations	\$424,242	\$424,242
Revenue Totals	\$3,644,440	\$3,644,440
Cost of Sales		
Operating Inventory	\$1,612,211	\$1,612,211
Provision	\$100,000	\$100,000
Programs	\$100,000	\$100,000
Shipping Inventory	\$100,000	\$100,000
Cost of Materials	\$1,912,211	\$1,912,211
Other Costs	\$1,457,199	\$1,457,199
Depreciation	\$200,000	\$200,000
Software Licenses	\$200,000	\$200,000
Research and Development	\$200,000	\$200,000
Total Cost of Sales	\$3,771,410	\$3,771,410
Gross Profit	\$873,030	\$873,030
Less selling, general and admin. expenses	\$289,000	\$289,000
Marketing, travel, sales, operations	\$1,000,000	\$1,000,000
Other income and expenses		
Other income	\$11,000	\$11,000
Other expenses	\$11,000	\$11,000
Cost of Sales on basis of fixed costs	\$0.00	\$0.00
Provision for Income Taxes	\$200,000	\$200,000
Current income taxes	\$1,000,000	\$1,000,000
Deferred income taxes	\$1,000,000	\$1,000,000
Total income taxes for period	\$2,200,000	\$2,200,000

Produce annual-report quality output everyday

Letting you easily move 1-2-3 macros into SuperCalc5 and back again. Even toggling between menus is a snap for SuperCalc5.

But not for Excel®.

Which now brings us to the "E" word. Unlike Excel, SuperCalc5 runs on all IBM®

Microsoft. IBM is a registered trademark of International Business Machines.



**COMPUTER
ASSOCIATES**
Software superior by design.

from accommodating 5¼-inch internal drives. This means that you cannot put Apple's new 160-megabyte internal drive under the hood of a IIcx. (This drive will fit inside a Mac II or a IIx.) We rate the IIcx very good on expandability.

DOCUMENTATION:

Many consumer products come with documentation labeled "Open me first." With the IIcx, you also get an "Open me second" and "Open me third." Apple appears to be taking no chances.

The two new additions for this computer are a brief *Guide to Setting Up Your Mac IIcx*, and a IIcx owner's guide. Both contain lots of pictures, and the owner's guide has detailed information about setup, the inside of the computer, and technical material. As usual, a Tour disk supplements the reading and makes it enjoyable for the Macintosh novice to get started.

The other manuals are the same as for the IIx and SE/30 and include a quick-reference card, *System Software User's Guide 6.0 and Update Apple FDHD*, *Hypercard User's Guide and Update 1.2*, and *Utilities User's Guide*. The documentation is of the same high quality that has accompanied the other Macintosh computers, and even though we are still looking for "Open me fourth," we rate it very good.

SETUP:

By juggling three slots of the Mac IIcx, Apple was able to reduce the footprint of the IIcx by 36 percent. They also placed the openings for the reset switch in front of the system and used rubber feet that are easy to remove. This means that you can set the system on its side next to your monitor or next to your desk.

With the system and monitor on a shelf above the desk, you have easy access to the floppy drive and lots of empty space on the desk surface where your Mac II once stood. Now that you have more options for locating the CPU, you must also make sure that your cables are long enough.

External ports are marked with icons, and cables are simple to plug in. A

convenient single screw secures the lid if you have to open the system to install your monitor card or other Nubus cards. The Nubus sockets are slightly different, making it easier to drop in the cards after you remove a plastic plate from the back of the case.

The software tools for initializing and installing system software on your hard disk are simple to use. You can also establish partitions for Macintosh and A/UX volumes if necessary. Further setup may involve the installation of additional system fonts and desk accessories, which should only take a few minutes.

The SCSI port can make life easier if you have to copy lots of software from an existing system or set up multiple systems. Once you have the software set up on one Mac, you can quickly copy it to an external SCSI drive, which can then be connected to other systems one at a time for software installation.

In most cases, your dealer will install the internal cards and set up your system software. If this is true, you will only need a few minutes to unpack and set up your system along with the time it takes to drag your application software onto the hard disk. Even if you have to do all the work yourself, we rate setup as very good.

EASE OF USE:

The smaller size contributes subtly to the overall ease of use for this system since it leaves more desk space free. The introduction of the power-on locking switch also helps since the system can be set to reboot if there is a loss of power. The remaining Macintosh ease-of-use features are all in place, earning the usual Macintosh excellent rating for ease of use.

SERVICEABILITY:

The IIcx sports the same high quality of workmanship that we have seen in the Mac IIx and SE/30. It features many VLSI chips and abundant surface-mount technology with components on both sides of the logic board.

There is only one screw on the inside that must be removed if you want to take the system completely apart. We were impressed with the workmanship and

design as we slipped each component out. After the system was entirely apart, we found that it took under five minutes to reassemble it. An experienced technician could, no doubt, cut this time in half. We rate the repairability excellent.

Apple relies on authorized Apple dealers for support. Owners of large numbers of systems can become service owners with the same access to Apple support and parts pricing that dealers have. The Mac IIcx comes with a 90-day warranty for defective parts, and you may purchase an Apple Care Service Agreement for extended coverage of up to three years. The brief warranty and the dealer-only support earn an unacceptable rating for support policies.

Experienced dealers will find it simple to fit this system under their support umbrella. The modular nature of the product along with the fine dealer diagnostic system will make repair work easy to learn and perform. The quality of support will depend on your dealer; our policy is that the lack of direct vendor support results in a score of poor for technical support.

VALUE:

The system we tested with 4 megabytes of RAM and an 80-megabyte internal hard disk has a list price of \$7,069. This is \$800 less than a comparably equipped Mac IIx. To gain the savings and the IIcx's smaller footprint, you give up three Nubus slots and the capability to install Apple's new internal 160-megabyte hard disk.

At this time, very few Macintosh users need more than three Nubus slots. This means that the Mac IIcx can give most people all of the functionality of a Mac IIx at a savings of money and desk space. Considering the speed, expandability, access to MS-DOS and OS/2 files, and the capability to run A/UX, we feel that the Mac IIcx is a very good value. □

Doug Green is director of computer services for a New York state school district and has also taught computer programming. Denise Green is an educational computer consultant and teaches computer use to adults.

Packrat PIM for Windows Helps Users Get Organized

It has 7 data storage facilities, capability for cross-referencing.

BY JOHN WALKENBACH REVIEW BOARD

Personal information managers are emerging as an important class of software. (See Product Comparison, November 7, 1988, Page 57.) Packrat is the only product we've seen in this category that runs under Microsoft Windows. As with all personal information managers (PIMs), Packrat lets you store a variety of information, and makes it all easily accessible from several perspectives. Windows users will find it capable and useful.

FEATURES:

One Packrat feature will be obvious to Windows users: If you use full Windows, not the run-time version, the program can be accessed even if you're in the middle of another application. Most of the other PIMs we've evaluated suffer from the lack of such a capability. Its Windows environment sidesteps this problem nicely.

Packrat is based on seven "facilities," such as a phone book, calendar, and expense log. For organizing your time, there is an agenda and a task-list facility. For storing more general information, Packrat provides an index-card facility, while another facility lets you log disk files into your database. Each facility can display its data in two formats, which can be searched by the database. In addition, Packrat works with two other lists: a date list and a global list that can hold items from multiple facilities.

Each item in your database has a summary line (limited to 40 characters) as well as fields labels (maximum of eight per item) that can contain keywords or other more structured information. In addition, each item can have a note attached, and index cards can even have a graphic image.

When you search for information within a facility, Packrat displays the summary lines as a list, or view, of more specific information for an item, you select the summary line from the list and click (or press Enter). Searches can be made by using keywords or dates. Searches are limited to a single facility, except for a global search that works across all Packrat facilities. This is a field for each facility, so you can easily work with multiple groups of information.

The type of information you put into Packrat depends on which facility you're using, but all data are entered via a common Add menu. For example, the Expense Log has a separate field for amount, whereas the Agenda facility has fields designed to schedule appointments. Index cards, on the other hand, are designed to hold user-entered keywords.

Packrat's power becomes evident when using the program's cross-referencing capability. This is a field for attaching an item to other items—either within the same facility or across facilities. For example, you might attach



Protect the one you love.

Yours is not just any computer. It's your friend. Your confidant. Your business partner. You wouldn't be without it.

But it can happen in a flash. A sudden storm, distant ditch digger, motor, or even a toy metallic balloon can send data-killing, component-killing electric surges and sags smack into your computer. Even knock it out altogether.

It's a matter of time before this happens to you. So protect your friend with Emerson's

new low-cost SW1000 Uninterruptible Power System. Only 2¼ in. high, it fits smartly right under your PC's monitor for less than \$700.

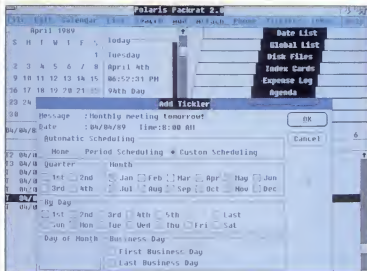
In a brownout or blackout, a battery will instantly take over giving you ten minutes or more to shut down your computer.

Call 1-800-Back-UPS for the Emerson dealer nearest you. Before it's too late.

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Computers Won't Run Right
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*Limit 1 per customer. Offer expires September 30, 1989. Dealer. For reimbursement, forward copy of sales slip UPS serial No., and customer name, address and phone number to: Marketing Services, Emerson Computer Power, 3300 S. Standard Street, Santa Ana, CA 92705.

© 1989 Emerson Electric Co.



Polaris's Packrat lets you search for and store data in a variety of ways. In addition, you can set up a tickler file to remind you of important events.

names of people who are working on a particular task. You can search through attached items and easily detach items.

Those who bill time by the hour will be interested to note that Packrat's facilities have a built-in timer. Time spent while each individual item is displayed can accumulate. You can turn the timers on and off with a click of your mouse.

PERFORMANCE:

We tested Packrat on a 386-based PS/2 Model 70 and on an AT clone running at 10 MHz. Both had Windows 2.03 in-

stalled. We recommend using a mouse.

As we indicated, Packrat's items consist of structured information in the following categories: index cards, expense logs, agenda items, tasks, and phone logs. In addition, an item can be a disk file, and you can even attach a graphic image to an index card item. You enter items by filling in the appropriate form for each type of item. You have complete control over the field labels and can define as many sets of labels as you require.

Items can also have notes attached, up to 32K in length. In addition, index card

items can incorporate graphic images pasted from the Windows clipboard or from Paint or TIFF files. Packrat is flexible and can hold just about any type of personal information. For item handling, we rate Packrat very good.

For calendar and scheduling tasks, Packrat provides two facilities: Agenda and Task. The former is for scheduling appointments and related notes for meetings and events. It's easy to schedule recurring meetings, and alarms can be set to provide a reminder. You can attach agenda items to people in the phone book, so you can get a list of people related to a specific topic.

The task list is basically a prioritized to-do list. It also has an alarm function and lets you assign tasks to others. Tasks are carried over to subsequent days until they are completed. Tasks can also be defined as either dependent on or as a prerequisite to another task.

An on-screen calendar is always displayed, and you can use it to selectively display items that fall on a particular date. In addition, you can drag the mouse pointer over a series of dates to get items that fall within a range. A simple time line is also displayed that shows Agenda commitments for the selected day. You can schedule recurring meetings in one fell swoop, and the program can check for scheduling conflicts. The product's calendar and scheduling performance earns a very good rating.

Data retrieval is easy as long as you take the time to enter appropriate keywords. One of the main limitations of this product is complete reliance on the user to enter keywords. And for some reason, Packrat doesn't let you search for text contained in item summaries.

Search requests can't be too complex: You can enter several keywords, which are operated on with a logical or, but you can't search for keywords with a logical and. For example, you can't retrieve all items that have both meeting and *Sacramento* as keywords. In reality, this doesn't present much of a problem, since it's easy to screen a list of items once a search is performed. Other search features let you search for text in print notes and also restrict searches to a range of dates. We rate Packrat satisfactory for data retrieval.

When you require a hard copy, Packrat presents you with a dialog box to select the preformatted report. Although several reports are provided, we didn't find Packrat's reporting to be very flexible. For example, you can't print only the item summary and notes. An alternative solution is to print the full detail report to disk and edit the file before printing. Other print options include phone book reports, envelopes, and mailing labels. A catalog feature lets you save Web List items to print reports for frequently used reports. On balance, reporting capabilities are satisfactory.

Packrat's import/export capability works well—but importing will usually require some trial and error and reformatting of your ASCII files. This is the only PIM we've seen that can work with graphic images. It can also use the Windows Dynamic Data Exchange (DDE) protocol, and a demo file shows how an Excel macro can read information from Packrat. In addition, you can attach data files and run applications directly from Packrat (but not with the run-time Windows 2.03). These additional features contribute to its very good score for other features.



Steve Gibson Has Invented The Way To PREVENT AND ELIMINATE HARD DISK PROBLEMS!

If you use SpinRite™ every two or three months, you'll never have ANY PROBLEMS with your hard disks.

The low-level format of your hard disk drive is probably the last thing you want to think about, let alone worry about. But like the foundation of your home, you depend upon it every day without ever giving it a second thought... until something goes wrong.

Every byte of data stored in your hard disk rests upon the drive's low-level format foundation. When that foundation weakens, DOS begins reporting errors such as:

**BOOT FAILURE
SECTOR NOT FOUND
BAD SECTOR ERROR
GENERAL FAILURE READING DRIVE
ABORT, RETRY, IGNORE**

That's how your vital data becomes hard to recover, or lost forever. This problem makes our personal computer hard disk drives the least reliable components in our computers.

Today you have two choices: Sit around worrying about the safety of your data, backing up the drive continually to minimize the extent of the loss when it occurs...

Or cure the problem at its source by preventing your drive's low-level foundation from ever weakening and crumbling.

SpinRite completely eliminates the problem of gradual low-level format deterioration by quickly low-level reformatting any DOS hard disk while leaving all its data in place...

But SpinRite goes FAR BEYOND JUST THAT!

SpinRite's Main Features:

SpinRite is an all-in-one, total, low-level format maintenance, repair, and optimization utility.

- Non-destructively low-level reformat any DOS hard disk drive in minutes. Backup & restore, before and after, are not required!
- Fully automatic surface defect management utilizing the industry's most extensive worst-case data pattern analysis.
- "On-the-fly" instant sector interleave optimization establishes the maximum possible drive data transfer rate.
- Recovery and repair of correctable and completely uncorrectable (unreadable) data!
- Identification, diagnosis, and repair of every form of data and format damage.
- MFII, RLL, ARLL, and ERLI Compatible.

- In a matter of minutes it gives any DOS drive a completely new clean, stable, and solid low-level format WITHOUT requiring a tedious backup & restore operation.
- It detects and eliminates all data-threatening hard disk errors (which DOS can't see) long before they become data-damaging.
- It instantly optimizes and resets the drive's sector interleave, guaranteeing maximum possible data transfer rates.
- It locates and isolates all data-threatening surface defects. (Two to three times more than ANY other surface testing software!)

Anyone with a hard disk is invited to purchase SpinRite without hesitation. It is extremely easy to use with a simple user-interface, on-line help, an on-line index, and a short 40-page owner's guide booklet.

SpinRite is immediately available from:

**Gibson Research Corporation
P.O. Box 6024, Irvine, CA 92716
(714) 854-1520**

\$59 plus \$1.50 shipping and handling. Please send check, request UPS COD, Credit Card Orders CANNOT be accepted at this time. California residents must include 6% state sales tax.



DOCUMENTATION:

The documentation consists of a well-organized manual packaged in a three-ring binder, as well as an on-line help system. Although the on-line help system is context-sensitive, we sometimes found that the quality of information provided was lacking in depth, or missing altogether. For example, there is no help screen to explain what the various report selections will give you. In addition, you can't get any additional help if you're presented with a pop-up error or warning message.

Packrat's manual is very good, but when we also considered the sometimes-lacking on-line help system, it yields a good score overall for documentation.

EASE OF LEARNING:

Packrat isn't the type of product that you can load onto your system and master through experimentation. First, you need to understand a few key concepts. For example, you need to get used to entering keywords, and you also need to learn the basics of each of seven reports. Going through the tutorial is almost mandatory. If you're motivated enough, you can become familiar with the basics in a few hours, and be on your way to putting it to use after a few more hours. Ease of learning earns a good score.

REPORT CARD INFO WORLD

PERSONAL INFORMATION MANAGER**Packrat**

VERSION 2.0

Criteria (Weighting) Score

Performance

Item handling	(100)	Very Good
Calendar scheduling	(100)	Very Good
Data retrieval	(75)	Satisfactory
Reporting	(75)	Satisfactory
Other features	(75)	Very Good
Documentation	(100)	Good
Ease of learning	(100)	Good
Ease of use	(125)	Very Good
Error handling	(50)	Very Good

Support

Support policies	(25)	Satisfactory
Technical support	(50)	Excellent
Value	(125)	Good

Final score **6.7****PRODUCT SUMMARY**

Company: Polaris Software, 613 W. Valley Parkway, Suite 323, Escondido, CA 92025; (619) 743-7800.

List Price: \$395.

Requires: IBM PC, XT, AT, or PS/2; graphics display; hard disk; Windows/286 or Windows/386 optional (a run-time version is included); mouse recommended.

Pros: All information is readily accessible (if running under Windows); good mix of features.

Cons: Can be sluggish on slower systems; reporting could be more flexible; on-line help often lacks depth.

Summary: A personal information manager that packs a lot of extras, including Windows support, the capability to work with graphics images, and support for Microsoft's DDE protocol.

EASE OF USE:

Once learned, Packrat presents no real problems in terms of ease of use. Like many Windows applications, the biggest complaint is its sometimes sluggish screen updating on slower systems. On a 386 or a fast 286, speed isn't much of an issue.

Packrat is a keystroke-intensive. It takes a long time to enter items, since you must enter start and end dates for tasks and agenda items—and manually enter your agenda items. Unlike Lotus Agenda, Packrat can't automatically assign items to categories based on their content.

As we've mentioned, your database is really only as good as the keywords you enter for each item. It is cumbersome at first, but you soon get used to entering keywords for each item. You can also request a list of keywords—for consistency. If you discover that you have too many keywords, a handy feature lets you do a global search and replace. For example, in the Expense Log, you might want to replace all occurrences of "Dinner" and "Lunch" with "Meal."

Since the phone-log information in some other format, you can import it into Packrat.

You must make sure each field is in quotes and separated by a comma.

Contributing to Packrat's ease of use are its phone features. When you set up your phone book, you have complete control over deleting options. After an call is made, you're presented with a empty phone-log item for making notes on your call. The phone-log item can be attached to the name in the phone book, so you can subsequently display all calls made to or received from a particular person. While you're writing a note during a phone call, you're presented with any other facility without affecting the note (or the elapsed time, if selected). Ease of use earns a very good score.

ERROR HANDLING:

Packrat generally handles user errors by displaying a warning or error message in a pop-up box. As indicated above, the messages are often cursory, and no additional help is available.

A menu item called "off-load" lets you back up your entire database on another device. You can also password-protect your database to prevent unauthorized tampering. When you enter data, it's automatically saved, so you don't have to worry about quitting the program and losing data. We didn't experience any problems with Packrat's error handling, and award it a very good score.

SUPPORT:

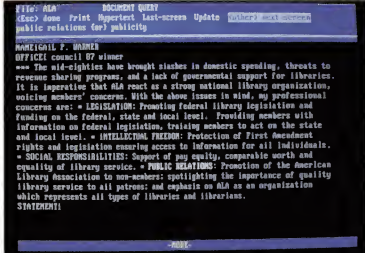
Polaris Software offers unlimited technical support by phone via a toll call—qualifying for a satisfactory rating in support policies.

We made two calls to Polaris. Both were answered immediately by a knowledgeable support representative. We uncovered a minor bug and were promised a fix in the mail. It arrived within a week. Packrat's technical support rates excellent.

VALUE:

At \$395, Packrat is priced pretty much on par with other PIMs. If you're a dedicated Windows user, this product may offer some advantages over the other products we've reviewed. Packrat isn't as powerful or slick as Lotus Agenda, but it will certainly meet the needs of most users. Even if you don't use all of the facilities of Packrat, it still qualifies as a good value. C

Contributing editor John Walkenbach is consumer research manager for a leading savings and loan association in Southern California.



The capability to enter and manipulate free-form text in Ask Sam makes it very powerful. But commands and field definitions are complex.

Ask Sam Database Features Strong Flexibility, Speed

Intriguing for text searching and formatting, some complexities can hamper its usability.

BY ERNEST PEREZ REVIEW BOARD

You may have seen recent Seaside Software advertisements proudly claiming that the "U.S. Senate used the Ask Sam text database to manage every word of the Iran-Contra hearings." Ask Sam is promoted as a powerful, free-form text database with easy data entry, fast retrieval, and heavy-duty report formatting capabilities.

We found the product intriguing for text searching and formatting experiments, but we also found it to have some significant complexities that can hamper usability.

We previously reviewed Ask Sam, Version 3.02 on April 20, 1987 (Page 59). Here we review the latest update of the product, Version 4.1.

FEATURES:

Ask Sam's approach is unusual in that it accesses text using a fast sequential text-indexing algorithm, instead of the more common inverted index method. Unlike Zyindex, for example, Ask Sam does not create an index. Ask Sam retrieves information by searching for any word, phrase, number, or symbol in a database record. You can use wild cards and intricate logical conditions, and you can sort results using virtually any data element.

Ask Sam records are totally free form, with optional fields. Despite the free-form record orientation, Ask Sam can format reports and do numerical calculations on data in the records. Furthermore, when you retrieve data or generate reports, you can use any data string in any record as a field.

Data is stored in one-page records of up to 20 lines each. Free-form retrieval produces the records that contain a "hit," or can be formatted to produce a specific number of records or lines surrounding a hit (a proximity search).

The Ask Sam command language can be used from the command line or for writing stored programs. The command language programs can handle complex retrieval and reporting operations or

manage end-user applications.

This version of Ask Sam features a hypertext mode used for point-and-shoot menu applications. By highlighting displayed text, you can automatically search for words or phrases.

Ask Sam also has a built-in phone dialer and supports a mouse.

PERFORMANCE:

Ask Sam's search power is Ask Sam's claim to fame. Actually, in addition to its free-form approach, Ask Sam uses three different field look-alike approaches that allow you to search specific fields.

The explicit field is the most similar to a standard defined field: this is simply a word followed by a left bracket ([). The text string that follows (until it encounters the end of the line, a blank line, or a right bracket) is considered the entry for that field. For instance, NAME[1] could be a field name for the text following it. Explicit fields are used where you expect to regularly use a certain kind of information. It makes it easier for search and report definition.

Implicit fields are certain data flags, such as \$ in \$49.95 or any number in an inventory document beginning with NOW. Contextual fields are unique words you define as a field on the fly; for example, President Bill Jones.

Ask Sam does not use the common database language approach of reserved words for commands. Instead, Ask Sam requires "curly brace" flags or delimiters ([]) to identify Boolean logic and other commands. Reserved words and statements such as sort, not, col, index, and others. For example, to search for Oliver and North or ambassador not Nicaragua you enter Oliver [and] North [or] ambassador [not] Nicaragua.

The curly brace method can be a problem. As stated characters, they are difficult to type quickly. However, since you can customize virtually any common keystrokes (much like a macro) and place them on a hypertext menu record, as you gain proficiency with the program you can assign easier keystrokes as substitutes.

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From top to bottom:
Elegance Model 1000,
20 and 25 MHz;
Elegance Model 2000,
20 and 25 MHz;
Elegance Model 3000
25MHz

Another problem is that Ask Sam evaluates Boolean logic operators in a strict left-to-right sequence, instead of the more conventional precedence-of-operation method. The program does not allow the use of parentheses to clarify your logical meaning. Consequently, the results of a query can be very unpredictable. The vendor says this method is by design: They used the nonstandard approach to ensure an upgrade path as they add new and more sophisticated features.

On-the-fly field definition requirements, combined with whatever command delimiters you may use, can result in complex and confusing commands like `loser | and 1988 | and OFFICE/NAME/ | col30 BEFORE | 1988 | col50 AFTER | 1988`. This basically simple search and print formatting command statement means, "Find the candidate records with 1988 and Loser in the office field; display them in a column format with name at column 1, the office sought [the word before 1988 in the record] at column 30, and Loser [the word after 1988 in the record] displayed as the status in column 50."

Ask Sam has a screen-size record limit of 20 lines or 1,600 characters. Related records can be easily linked to form documents that can be searched or printed as a single item. You can also easily insert a new record between existing records.

But difficulties occur when you try to edit or expand existing multiple-record documents. For example, if you are editing a record and it's nearly full, you cannot add text that would exceed the 20-line record size limit.

We checked with the vendor about a method for adding text and for keeping

clean-looking, full-screen records. They informed us that the only solution was to go to the last document and expand from there by opening up enough room for carry-over text that you cut and paste from other records. This method is unusual for a text-oriented database.

At first glance, the freedom-from-fields approach seems like a great idea. However, making heavy use of the fields feature requires amazingly complex programming and lots of trial and error, even for queries. For generating formatted reports, we found practically every reporting operation involved a lot of work, accompanied by myriad errors and revisions. If all you're trying to do is dump some selected "bit" records, however, the process is very simple.

The program provides no form of data validation for explicit fields; the vendor says a future version will add validation.

On a positive note, Ask Sam's sequential access method was very fast in text retrieval compared to other text databases we have used. We searched a 216K test file using a slow old XT clone as well as an IBM PS/2 Model 30. There was no appreciable difference in retrieval speed for single words, phrases, or complex conditional requests using applied and contextual fields. The clone found single words in seven seconds and complex requests in nine seconds. The PS/2 accomplished the same searches in three and four seconds, respectively. The sequential access algorithm is surprisingly fast.

Ask Sam supports disk file import and export (files in its own format and ASCII only). Given the screen-size record limit, it will automatically carry any overflow during import into linked records. The vendor is working on additional file

import and export support, and comma delimited, fixed position delimited, and Dbase file format support is available on the Ask Sam bulletin board. Importing files is fast and easy.

"The program is highly flexible, fully featured, extremely fast, and capable of exploiting any text-database activity to its limit."

Ask Sam's real strength lies in its powerful report-formatting capabilities. Reports can be up to 160 columns wide; you can tab or space to a defined-column position, set margins, use the optional word wrap, justify, do complex sorts, and more. You can define and format up to eight levels of data field breaks. After you specify print-formatting commands in your file, you access a basic print command from the main file menu.

Ask Sam's new hypertext facility is a simple, effective, point-and-shoot menu function, and is a basic interface tool to create elaborate operational and information retrieval applications. It can treat highlighted words or phrases as search,

program command, or file display input. It does not, however, have any kind of organizational or authoring tools for planning hypertext applications. The vendor offers a related run-time hypertext product called Hypersift that can be distributed with hypertext applications created under Ask Sam.

Also new in this version is Dialog, which lets you write statements that will prompt users to input programmed variables. This helps control search terms, global file access, print routing, and other items.

Ask Sam performance is a strange brew. The imaginative attempt to introduce field-definition capabilities in a free-form text database gives unique power but at the cost of clumsy delimiters, a command-line interface, as well as complexity and difficulty in actual use. Yet the program is highly flexible, fully featured, extremely fast, and capable of exploiting any text-database activity to its limit. Limited by its difficult interface and unorthodox logic and commands, and also due to the complexity of commands and limits on record size, we cannot give Ask Sam any higher than a good score in performance.

DOCUMENTATION:

Ask Sam documentation contains an introduction, a written tutorial sequence, and a detailed reference section. There are also several on-line tutorial demonstration applications.

While individual sections of the documentation are clearly written, the overall approach is disorganized and patchy, with occasional errors. Fortunately, the manual contains a nice table of contents and a comprehensive index.

Diamond Scan 14
Auto-Tracking
800 x 600 pixels (digital, analog, monochrome)
330 x 500 pixels (composite NTSC)

Diamond Scan 20A
Auto-Tracking
800 x 600 pixels (digital, analog, monochrome)
1024 x 600 pixels (maximum)

Diamond Scan 16L
Auto-Tracking
1024 x 768 pixels (typical)
1280 x 1024 pixels (maximum)

Diamond Scan 20L
Auto-Tracking
Up to 1280 x 1024 pixels

Actual unretouched screen images

A Clear View To Monitor Quality

Using a mouse with Ask Sam can be convenient; however, the instructions are difficult to follow and poorly written.

Because of the problems and disorganization of both the manual and the on-line help, we must give documentation a poor score.

EASE OF LEARNING:

Following installation, most users should be able to get through the Ask Sam tutorials and demonstration files in two or three hours. Getting up to speed at every basic level is relatively easy — to the point of doing basic data entry, searching, and sorting without getting too involved in field work.

Installation, however, required guesswork when the program asked configuration questions not covered in the documentation. There are interesting and creative on-line demonstration and hypertext files that are started, oddly enough, by entering a Readme/Introduction file.

Ask Sam doesn't take an effective approach in teaching users an unusual, difficult-to-master piece of software, and while easy at a basic level, it will take several weeks to learn the complex field command language.

Poor documentation further hinders learning an already unusual, difficult, and multifaceted product, yet it is generally easy to reach a basic operating level. Overall, we rate ease of learning poor because learning any of its powerful, more sophisticated features is difficult.

EASE OF USE:

Ask Sam menus are easy to use, but the command language, when working with fields, is clumsy and non-intuitive. You'll

have to spend lots of time referring to the manual or the on-line help for assistance with command usage.

The programming language is complicated, made more difficult by unusual

"Anything you want to do — including large searching and sorting tasks — is very fast."

command language syntax and the difficulty of trying to deal with nonstandardized data. The lack of field definition will often force you to experiment and develop complex programming logic.

On the other hand, ease of use is enhanced by Ask Sam's speed. Anything you want to do — including large searching and sorting tasks — is very fast.

Ask Sam is also very flexible. For the experienced user, many modifications and customizations can be accomplished. At a basic level, if all you want to do is keep a simple, free-form text database into which you are able to enter text and easily locate things, Ask Sam is easy to use, although it will be akin to using a bulldozer to weed your garden. The vendor says that some of the happiest Ask Sam users are those that have never seen a conventional database. This can, of

course, also be construed to mean that ignorance is bliss.

With all these factors considered, we rate Ask Sam satisfactory in ease of use.

ERROR HANDLING:

Ask Sam was very stable during our evaluation, and even pressing Shift/Print Screen without turning on the printer merely brought up the gentle message, "Your printer is not on."

But there are other dangers. While good updates are easy, the documentation warns you that the file size can nearly double if the batch update extends established records by even one character (before they are packed). If you run out of disk space before you complete the batch update, the file will be only partially updated. (There is a modified Undo command, however. If you make a data-entry error, you can press Escape to restore the screen — but everything entered on that screen will be erased.)

Modifying your database is a deceptively easy, one-way street, with lots of potential problems. For instance, when doing a simple name change in our test database, we forgot to enter an asterisk after each left bracket, which resulted in the loss of all data in that field for all records.

Although not obviously documented, Ask Sam automatically saves a modified file after approximately 30 seconds. This feature cannot be altered.

Backups can be made from the main menu, which creates an extra backup file. However, when you pack a file, two versions are saved; we ultimately ended up with well over 1 megabyte of data files for a 200,000-character database. This second-generation file save capability can

be handy, or you can choose not to use it if you are concerned about disk space.

While it is stable, Ask Sam's unforgiving approach to user errors and data security results in a poor score for error handling.

SUPPORT:

The vendor offers unlimited telephone support during normal East Coast business hours. They operate a bulletin board system and distribute a free newsletter to registered users. There is also a 60-day money-back guarantee. Corporate support is available. We rate support policies very good.

When we called technical support, an operator answered promptly and connected us to a technical support representative within 30 seconds.

The support staff was courteous and knowledgeable about the product. They answered our questions quickly and straightforwardly, and we rate technical support satisfactory.

VALUE:

At \$295, Ask Sam 4.1 is not overpriced but is up against rather stiff competition in software of comparable functions. While Ask Sam provides unique functions, it has several drawbacks. One of the simple, flat-file databases can handle text, and accomplish a lot of Ask Sam's registered users and computational work. If retrieval is what you're looking for, there are other user-friendly alternatives on the market.

Ize is its strongest text-database competitor, Zindex is tops for fast information retrieval access to ASCII and word processor files, and Nutshell Plus combines fast, good text retrieval with easy-

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Mitsubishi Model	Screen Size (inches)	Horizontal Scan Frequency (kHz)	Mask Pitch (mm)	Compatibility/Resolution						
				NTSC	CGA	EGA	Std.	Ext.	Apple Mac II	1024 x 768 (64 kHz)
Diamond Scan 14 (AUM1381A)	14/13V	15.7 – 36 auto-tracking	0.31	*	*	*	*	*	*	
Diamond Scan 16L* (HL6055TK)	16/15V	30 – 64 auto-tracking	0.31			*	*	*	*	*
Diamond Scan 20A (HA3956ADK)	20/19V	15.7 – 36 auto-tracking	0.31	*	*	*	*	*	*	
Diamond Scan 20L* (HL6905TK)	20/19V	30 – 64 auto-tracking	0.31			*	*	*	*	*
XC1429C	14/13V	31.5	0.28			*	*			
XC1410C	14/13V	22 or 15.75	0.40		*	*				
XC1430C	14/13V	22 or 15.75	0.31		*	*				

*Microprocessor-enhanced programmable display settings



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Why 1-2-3 users are d computers for the se



It first happened
about six years ago.

When you made the
jump from paper ledgers to
something called the PC.

If you'll recall, that
little box, coupled with

Lotus® 1-2-3®, basically shot you from the Stone
Age to the Industrial Revolution.

Overnight.

Six years later, just when you were

convinced the thrill was gone, a situation
comes along to prove the exact opposite.

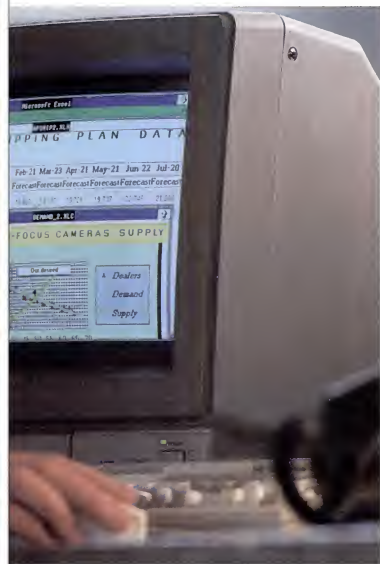
Briefly:

Character-
based technology
is being replaced
by the remarkable
power and simpli-
city of graphical
environments. It's no
secret that the PC industry is moving rapidly



*Finally, output that's admired, envied
and saved. Not tossed.*

Discovering cond time.



toward graphical platforms like Microsoft® Windows, MS® OS/2 Presentation Manager and, of course, the Macintosh®. It's a simple reality. Which means serious spreadsheet users are suddenly faced with a decision.

Stay with 1-2-3, the current character-based standard. Or move to Microsoft® Excel for Windows, the emerging standard designed expressly for graphical environments. Graphical as in

the simplest, most visual way to harness the power of the 286/386 machines—which in turn lets you easily tap all the power and glory of the spreadsheet.

We're not saying it's an easy decision. Just an inevitable one. And to help you make a more informed one, we offer the following:

Microsoft Excel lets you link multiple spreadsheets without the hassles of complex cell references—to link, you just point and click on the cells you want linked. That's it.

With Microsoft Excel you can work interactively—you can change fonts and sizes, add borders, shade areas, and see it all on screen. And, thanks to Print Preview, see exactly what you've done, *before* making a trip to the printer.

You can also create charts with a single keystroke. Make mistakes and simply "undo" them. Even adjust column widths or color without a laundry list of commands.

And no, your equity in 1-2-3 is not lost. Because Microsoft Excel actually reads and writes 1-2-3 files, guides you with 1-2-3 on-line help, and even helps you translate 1-2-3 macros. So making the switch is easier than you think.

All of which brings us back to the decision—and a simple fact: You have nothing to lose by calling for a free, fully functional Working Model of Microsoft Excel for Windows to use in a real-life situation. Yours.

It's the only way to fully appreciate the power of Microsoft Excel. And the quickest way to rekindle your long-time love affair with the PC: (800) 541-1261, Dept. J50.

We strongly suggest calling. Because if you think going from ledgers to computers was a thrill, you haven't seen anything yet.



Get a free Working Model of Microsoft Excel for Windows. After all, using is believing.

Microsoft
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to-use relational database reporting power.

Considering Ask Sam's limitations combined with its strong flexibility and fast speed, at \$295 we rate its value good. □

Ernest Perez has managed libraries and database operations for two major daily newspapers. He is a consultant specializing in text and hypertext database applications, headquartered in the Dallas area.

REPORT CARD INFO WORLD

TEXT DATABASE SOFTWARE

Ask Sam

VERSION 4.1

Criterion	(Weighting)	Score
Performance	(400)	Good
Documentation	(80)	Poor
Ease of learning	(40)	Poor
Ease of use	(120)	Satisfactory
Error handling	(80)	Poor
Support		
Support policies	(40)	Very Good
Technical support	(40)	Satisfactory
Value	(200)	Good
Final score		5.3

PRODUCT SUMMARY

Company: Ask Sam Systems, P.O. Box 1428, Perry, FL 32347; (904) 584-6590.

List Price: \$295.

Requires: IBM PC; DOS 2.0; 256K; one floppy drive.

Pros: Very fast; many features; flexible; strong support.

Cons: Complex programming language; difficult to learn; error handling needs improvement.

Summary: Ask Sam is a free-form text database that is very flexible, fast, and full-featured, but it is impeded by complexity and unorthodox operation.

REVIEW RESPONSES

What About TM/1?

After reading the article "Consolidating Spreadsheets" in the March 13 issue (Page 66), I can only wonder if you are aware of TM/1, a table manager and spreadsheet program by Sinper Corp.

As an owner of 10 retail hardware stores, I went through the frustrations of linking and consolidating spreadsheets to look at sales and expenses by store, or month, or department, or year. etc. I encountered TM/1 three years ago and have not looked back. TM/1 removes the drudgery and anxiety of working with other products and replaces it with elegant functionality. Unless it is tried and experienced, one will not believe that all other approaches to consolidation and analysis of data are archaic.

Maybe you consider TM/1 to be in a separate product category from spreadsheets and therefore do not include it in your comparative product evaluations. However, I think that you are doing your

readers a serious disservice by not even acquainting them with this fine solution to the needs of business analysis.

Alan Ziegler
Ace Hardware
Elgin, IL

We reviewed TM/1 August 15, 1988 (Page 57), and were indeed impressed enough to rate it a 7.0. TM/1 is an unusual product that we would characterize more as a table-oriented data manager than a spreadsheet. — Editors

Looking for SAS

Your magazine continues to be the best of the bunch. I have based many of my purchasing decisions on your comments. Your mix of news articles, product comparisons, and reviews is always timely and informative. The writing is usually clear, the audience's experience level correctly judged, and mistakes are few and far between.

Now for the downside (you knew it was coming). SAS by SAS Institute is rarely mentioned and has never been reviewed — at least not lately. SUGI, the SAS Users Group International's annual meeting was not even mentioned in your "Resources" section.

In our department, we use it extensively for a variety of purposes. It has come a long way from the mainframe days when only Ph.D. statisticians had any hope of understanding its purpose.

Lee Kinsey
CIBA Vision Corp.
Atlanta

We reviewed the SAS statistics package in a Product Comparison September 1, 1986. It scored a 4.8 under the rating system then in effect. In our September 19, 1988, Product Comparison of statistical packages, SAS Institute declined to participate. — Editors

Supercalc 5: The King

Well, thank God you finally see fit to recognize Supercalc's superior features and even allow as how it does virtually everything better than the vastly overrated Lotus 1-2-3. (See Supercalc 5 review, March 13, Page 66; Product Comparison, March 13, Page 72; Product Comparison, January 16, Page 47.) I have used Supercalc since its original CP/M days and have always found it much easier to use and more intuitive in its command structure than Lotus 1-2-3 and its clones. I was surprised and dismayed to see you state under ease of use that it generally takes more keystrokes to perform an action in Supercalc 5 than it does in 1-2-3. That is exactly 180 degrees backward. It is flat-out wrong. For all the most common commands, Supercalc 5 is much easier and uses fewer keystrokes than 1-2-3. Even more important, one also need not precede each formula with the brain-damaged @ sign.

I also object to you and all of the

computer press always presenting 1-2-3 in the most favorable light, with a concession you would never allow for any other product, including all its optional add-ons. The benchmark table tested 1-2-3 with the add-on Speedup, whereas no other product is ever benchmarked in other than its standard form. I do not believe that even a simple majority of current 1-2-3 users have obtained or have access to Speedup or the related "sort of" copy-protection removal now included. And I object to your making comparison statements about the expected final configuration of Lotus' current vaporware 1-2-3, Version 3, which has only just gone into beta release. No other product receives such gratuitous preview marketing assistance, nor should it.

What about bonus points for Supercalc's built-in audit capabilities? Isn't that much more important than bundling Always with a dinosaur to keep up sales? What about bonus points for the capability to store spreadsheet-independent macros or Execute files for powerful uses not even dreamed of by most 1-2-3 users?

In summary, my scoring would raise formulas/analysis (for auditing), ease of use (keytokens, customizability), ease of learning (same), and output (integrated, internal graphing) to excellent; capacity to very good (customizable RAM requirements) and award bonus points for technical merit on Execute macros and customizing RAM requirements, plus the capability to do all this on a plain-vanilla 8088 PC. In my mind, this would raise the score to over 8.5, maybe 8.9 or better. I can't say enough. Supercalc is the best text-based spreadsheet on the market.

Robert B. Steinbach
Creative Resources
Concord, CA

Our policy is to evaluate the currently shipping version; in the case of 1-2-3, the product is shipped without copy protection and bundled with Speedup, Learn, and Always. — Editors

Corrections

In our review of the Headstart III computer system (March 27, Page 66), we neglected to mention under support policies that Headstart Technologies includes 18 months of on-site service in the purchase price of its computers.

In our review of the AST Premium/386C (March 27, Page 65), we published an inaccurate table of performance speeds for several other 20 MHz 386 systems. The table was based on a previous version of the benchmark test, not directly comparable to the test now used. We apologize for the confusion. The table below shows comparable systems tested with the current benchmark.

InfoWorld welcomes comments about its reviews. Letters are subject to editing for space and clarity. Please address correspondence to the Reviews Editor, InfoWorld, 1060 Marsh Road, Suite C-200, Menlo Park, CA 94025.

InfoWorld Guide to Reviews

REVIEW SCORING

InfoWorld reviews only finished, production versions of products, never beta test versions.

Products receive ratings ranging from unacceptable to excellent in various categories. Scores are derived by multiplying the weighting (in parentheses) of each criterion by its rating, where:

Excellent = 1.0 — Outstanding in all areas.

Very Good = 0.75 — Meets all essential criteria and offers significant advantages.

Good = 0.625 — Meets essential criteria and includes some special features.

Satisfactory = 0.5 — Meets essential criteria.

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BENCHMARKS

386 Computers

System (clock speed/wait states)	CPU	Hard Disk Sequential	Hard Disk Random
AST Premium/386C (20/0)	5.2	4.3	3.8
Tussey Swan 386/200 (20/0)	3.7	3.1	3.4
Compaq Deskpro 386/20e (20/0)	5.4	3.6	2.9

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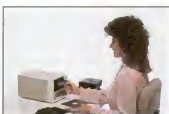


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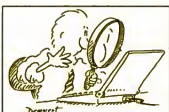
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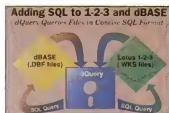
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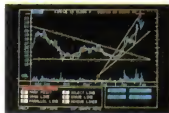
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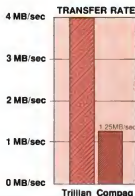
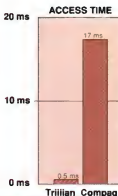
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372 Turquoise Street, Milpitas, CA 95035

To order, call toll-free (6am-5pm Pacific, 9am-8pm Eastern):



1-800-338-8386



In California: **(408) 942-1216**

FAX: (408) 942-1891

Dual Cache

with 0.5ms Access Time
Data Transfer Rate

STANDARD FEATURES

System Unit: 25 MHz or 20 MHz Intel 80386, 0 wait states. Floor-standing Upright™ case with 220 Watt power supply, 7 drive bays. Six 16-bit & two 8-bit expansion slots. Battery-backed clock/calendar. Compatible with IBM-AT and all IBM-PC/AT software including MS-DOS®, OS/2™, UNIX®, XENIX®, Novell®, and Windows/386™.

Memory Cache: 32 K, set associative, 4-way cache with write-back.

Caching Disk Controller: Combined two-hard, two-floppy. Guaranteed disk access of 0.5 ms. 4 MB/sec Transfer Rate. 512K cache RAM.

32-bit Memory: 1 MB, 80ns with 25 MHz, 100ns with 20 MHz systems.

Math Coprocessor Sockets: Intel 80387 and Weitek 3167. Dual purpose socket accommodates one coprocessor at a time.

I/O Ports: 1 parallel and 2 serial ports.

Floppy Drives: One 1.2 MB (5.25 inch) and one 1.44 MB (3.5 inch).

Keyboard: 101-key enhanced AT-style.

Software: Setup utilities. MS-DOS operating system and Directory Assistance™ file/directory management software.

CONFIGURATION OPTIONS

Processor Speed: 25MHz Intel®80386-25 or 20 MHz Intel 80386-20.

32-bit System Memory: 1 MB standard, expandable to 16 MB in 1 MB increments, directly on the system board.

Disk Cache Memory: 512 K standard, expandable to 3 MB, 6 MB, 9 MB, 12 MB or 16 MB.

Math Coprocessors: Weitek®3167 or Intel 80387.

Hard Disks: 65 MB RLL, 170 MB ESDI, 380 MB ESDI, 760 MB ESDI, 1,200 MB, 2,400 MB. All disk subsystems have access times of 0.5ms.

Video Subsystems: 14" flat screen Monochrome, 14" VGA 640x480, 14" VGA 800x600, 14" VGA 1024x768.

When ordering, please specify Part Number (e.g.: 70F-Mono)

20 MHz 25 MHz	Model 70F	Model 170F	Model 380F	Model 760F
Part Name	65MB (0.5ms) hard disk, RLL, 1:1 caching disk controller	170MB (0.5ms) hard disk, ESDI, 1:1 caching disk controller	380MB (0.5ms) hard disk, ESDI, 1:1 caching disk controller	760MB (0.5ms) hard disk, ESDI, 1:1 caching disk controller
Mono monitor	\$3,999	\$4,799	\$5,499	\$9,199
Mono graphics adapter	\$4,699	\$5,499	\$6,199	\$9,899
VGA-640	\$4,999	\$5,299	\$5,999	\$9,699
14" VGA monitor	\$5,199	\$5,999	\$6,699	\$10,399
VGA-800	\$4,699	\$5,499	\$6,199	\$9,899
14" VGA monitor	\$5,399	\$6,199	\$6,899	\$10,599
VGA-1024	\$5,599	\$6,399	\$7,099	\$10,799
14" VGA monitor	\$6,299	\$7,099	\$7,799	\$11,499
	70F-VGA-640	170F-VGA-640	380F-VGA-640	760F-VGA-640
	70F-VGA-800	170F-VGA-800	380F-VGA-800	760F-VGA-800
	70F-VGA-1024	170F-VGA-1024	380F-VGA-1024	760F-VGA-1024

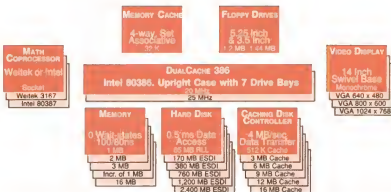
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Shipping: All orders are shipped UPS Blue. Prices do not include shipping, handling, and sales tax (where applicable).



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In California: (408)942-1216

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trillian™
Computer Corporation

372 Turquoise Street, Milpitas, CA 95035

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- 8087 Socket • 360K Floppy Drive • 1 Year Warranty

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CAT 386 SYSTEM

- 12" Amber Monitor with Graphics Interface Card
- 1.2 Meg Floppy Drive (expandable to 5 Meg)
- 1 Meg of Memory
- Parallel, Serial & Clock
- 70 Meg Hard Drive

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CAT™ 286-10MHz

- 512K Exp. to 1 MEG • 200 Watt Power Supply • AT Style Keyboard
- Western Digital Controller • 1.2 Meg Floppy • Legal Bios w/manuals • Systems Documentation • 1 yr war • Clock/Calc
- 10MHz DTK Motherboard

\$74900

11.3 NOTIONS SL

8088 XT Compatible

640 K Upgrade	139 ⁰⁰	Clock Calendar	24 ⁰⁰
12" Amber Monitor w/interface	139 ⁰⁰	Parallel & Serial Ports	39 ⁰⁰
DOS 4.01 w/GW BASIC	89 ⁰⁰	Additional Drives	See Below

SYSTEM OPTIONS

640 K Upgrade	59 ⁰⁰	14" EGA Monitor w/interface	549 ⁰⁰
1 Meg Upgrade	59 ⁰⁰	Novell Network, Call 12 Mhz add	100 ⁰⁰
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80286	8-10MHz	80287-8	229 ⁰⁰
80286	10MHz or more	80287-10	259 ⁰⁰
80386	16MHz	80387-16	379 ⁰⁰
80386	20MHz	80387-20	459 ⁰⁰
80386	25MHz	80387-25	559 ⁰⁰
386SX	16MHz	80387-SX	399 ⁰⁰

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For error correcting add \$10.00

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2400 Baud Internal w/cd software	109 ⁰⁰
2400 Baud External Fully Hayes Compatible	129 ⁰⁰

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4464 120 NS, 64x4	11 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰
4464 150 NS, 64x4	10 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰
4164 150 NS, 64x1	2 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰
4164 120 NS, 64x1	3 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰
4164 100 NS, 64x1	3 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰
256 x 8 120 NS	2 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰
256 x 9 80 NS	12 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰
256 x 9 120 NS	10 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰
256 x 9 120 NS	8 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰
1 Meg x 9 120 NS	29 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰
1 Meg x 9 100 NS	34 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰
1 Meg x 9 80 NS	39 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰
1 Meg x 8 120 NS	27 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰	1 ⁰⁰

MISCELLANEOUS

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2764-25	3 ⁰⁰
4128	3 ⁰⁰

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External Add 19⁰⁰

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ST277 60Meg 40 Mil 1/2 Ht	489 ⁰⁰
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With your KC-111, you receive your choice of either Westlake Data's award-winning PC-FullBak backup program, or Westlake's award-winning SafetyNet data recovery program.

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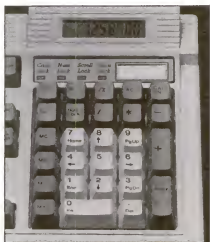
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Number of Keys	111	102	101
Built in calculator with solar power	✓		
Full-featured calculator memory	✓		
Free award-winning software	✓		
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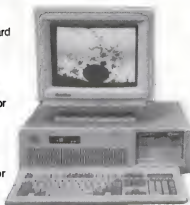
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- 20 MHz SI-23
- MM2 HD & FD Controller
- 80387 SOCKET
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- 40 MB ST-251
- One 1.2 MB FD
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- MONO SYTEM
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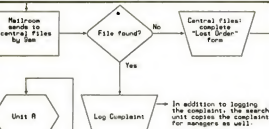
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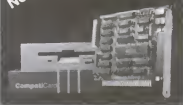
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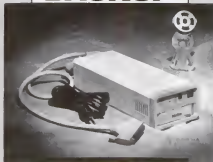
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IBM Shows Off Extended Edition Query Manager

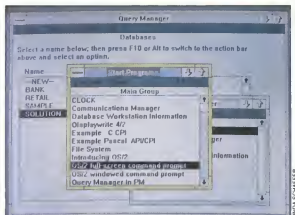
By Scott Mace

CHICAGO — IBM publicly demonstrated at Comdex last week for the first time parts of the Extended Edition 1.2 Query Manager interface, which uses Presentation Manager.

Another component of Extended Edition 1.2, called Remote Data Services, was demonstrated running on a Token Ring network using Extended Edition's Communication Manager running APPC protocols, but did not employ the IBM LAN Server or Requestor functions. (See related story, Page 1.)

The Query Manager can size windows, reduce them to icons, and support other Presentation Manager features.

In implementing Remote Data Services, IBM demonstrated SQL grant and revoke privileges on particular tables in an Extended Edition database in developers can use the Query



IBM's Extended Edition Query Manager can size windows, reduce them to icons, and support other Presentation Manager features.

Manager as a subset of its application, using the callable Query Manager API instead of C language as well as Pascal and Cobol, for which precompilers are being added in Extended Edition 1.2. IBM showed a Pascal program with a full-screen character-based interface that supports Presentation Manager. IBM also showed a Cobol application that imported Lotus files into an Extended Edition database using precompiled embedded SQL and SQL utility statements not precompiled.

Extended Edition 1.2 will ship this year. "Our tomorrow's councils are championing at the bit to start using this technology," an IBM spokesman said.

Intel Adds Low-Power 386SX To List of Chip Announcements

By Ron Copeland

Although Intel's product announcements last week included no real surprises, the 486, the 33-MHz 386DX, a low-power 16-MHz 386SX, and the host of support chips and development software were impressive.

Spotlighted was the newest member of its 80x86 line, the 486. The 25-MHz initial version, expected to be in full production late this year, will offer two to four times the performance of a 386 system.

A 33-MHz version of the 486, to be sampled in the third quarter, will offer 20 MIPS. The 486 is 100 percent binary-compatible with the 386, making it compatible with existing DOS, OS/2, and Unix software.

The 386 family also got a new top gun, the 33-MHz 386DX. It is apparently Intel's way of differentiating the 80386 line from the 386SX line.

To make the 386SX a more attractive alternative to laptop vendors, Intel also announced the availability of a low-power version of the 16-MHz 386SX microprocessor, including a 387SX math coprocessor and an 82385SX cache controller.

The chips are intended for laptop applications and offer the

Borland International, with plans to support the Extended Edition server, privately showed at Comdex embedded SQL. Two new keywords to be added to the Paradox Application Language let programmers place any arbitrary SQL statement in a PAL procedure, said Kenneth Eide, Borland's applications strategy director.

Borland hasn't said how embedded SQL will be packaged, but plans to deliver it in the second half of this year. Paradox will be able to act as a front end with either Extended Edition or SQL Server with identical SQL code. SQL programming isn't required for Paradox's QBE to access SQL data.

full 32-bit architecture. Featuring an idling mode that reduces power demands, system battery life can be extended to 30 percent. The new SX chips are also less temperature-sensitive, capable of withstanding up to 100 degrees Celsius.

Also announced were three versions of a LAN coprocessor chip, called the 82596. Scheduled for availability by the end of this year, the 82596 LAN coprocessor performs all CSMA/CD LAN processing functions independent of the CPU. The chip transfers data at 10.5 megabits per second, or full system bus bandwidth. It can support a fully loaded Ethernet network using as little as 3 percent of the system bus.

A 33-MHz version of the Extended Industry Standard Architecture (EISA) chip set, the 82350, will be in full production in the third quarter. It offers a full 32-bit bus at a 33-megabyte burst data rate. The 82350 also supports the i486. An optional 82355 bus master interface controller will be available.

The 82320 Micro Channel Architecture (MCA)-compatible chip will be sampled in the fourth quarter. The third-generation MCA chip set supports 386DX and 486 microprocessors at 25 MHz and 33 MHz.

Sun

Continued From Page 1

width, 3-by-10-inch expansion cards are also possible.

Expansion cards shown included an 8-megabyte memory expansion card, one for a second Ethernet (thick or thin) and the different display adapter cards.

Two of the display cards were monochrome, while a third provides 8 bits of color for Sun's 1,152-by-900-resolution displays.

The GX graphics adapters — available on both the SPARC-based and Motorola 68030-based systems — provide 450,000 2-D vectors or 100,000 3-D vectors per second. The GX graphics adapters support full-motion video, optimized for 320-by-200 resolution, and GKS software libraries.

The GXP graphics adapters offer 3-D solids modeling, 24-bit true color, and some serious competition for the Silicon Graphics Personal IRIS graphics workstations.

The more powerful SPARC workstations — the desksize SPARC-Station 330 and SPARC-Station 370 — are both 16-MIPS machines. The workstations are differentiated primarily by their main memory expansion (40 vs. 36 megabytes), by their number of VME bus slots (5 vs. 12), and by the potential hard disk capacity (1.3 gigabyte vs. 5 1/2 gigabyte). Base prices for the diskless SPARC-Station 330 and 370, with 17-inch, monochrome monitors and 8 megabytes of RAM, are \$29,900 and \$40,900, respectively.

Sun also showed server versions of the Models 330 and



The 3-MIPS Sun 3/80 uses the 25-MHz version of the Motorola 68030 chip.

370. The SPARC-Server 330 — with 8 megabytes of RAM, a 327-megabyte SCSI hard disk, and 150-megabyte tape backup — is priced at \$28,900. The SPARC-Server 370 — with 32 megabytes of RAM, a 981-megabyte hard disk, and a 150-megabyte tape backup — is priced at \$61,900.

A 32-bit version of the system, the SPARC-Server 390, has 16 VME slots, 32 megabytes of RAM, and a 1-gigabyte hard disk and sells for \$71,900.

Two Motorola 68030-based workstations, the 3-MIPS desksize Sun-3/80 and the 7-MIPS desksize Sun-3/470, use the 25-MHz and 33-MHz versions of the Motorola 68030, respectively. Base price of the diskless 17-inch monochrome Sun-3/80 with 4 megabytes of RAM is \$5,995. Base price of the 12-slot VME-based Sun-3/470 — with a 19-inch monitor, 8 megabytes of RAM, a 327-megabyte hard disk, and a 150-megabyte tape backup — is \$40,900.

Optional DOS emulation software is available for \$495. DOS version 3.31 systems are scheduled to begin in 60 to 90 days.

Sun Microsystems Inc., 2550 Garcia Ave., Mountain View, CA 94043; (415) 961-1300.

Prototype

Continued From Page 1

dramatic example of the architectural durability of the PS/2 family, which was specifically designed to allow upgrading."

Upgrading the Model 70 took under three hours, he said, and then showed how the 386 chip set without making any further adjustments.

"The fact that we had it up and running in three hours is a great tribute to Intel's design

quality as well as the PS/2 architecture and our engineering team in Boca Raton," Cannavino said.

Preliminary benchmarks show the machine running twice as fast as the Model 70 with the 25-MHz chip set installed, Cannavino said.

Although IBM received pinouts of the chip from Intel several months ago, it received the actual chip sample several weeks ago. Few adjustments had to be made to the Model 70 BIOS to run the 486, Cannavino said.

"We worked hard to have the capability to move forward without changing the BIOS," he said. "You can't customize the BIOS to each new megahertz or it'll run you down."

At the 486 announcement in Chicago, Intel executives as well as other industry leaders such as Cannavino, Compaq Computer Corp.'s Rod Canion, and Microsoft's Bill Gates emphasized that although the 486 represents a powerful and exciting new technology, it would cause end-users relatively little disruption adapting it into current computing environments.



IBM's James Cannavino said the Model 70 BIOS needed little adjustment to run the 486.



IBM's Lee Reiswig said month-to-month sales of OS/2 should surpass those of DOS by 1992.

Remote

Continued From Page 1

those of DOS by 1992.

IBM here last week demonstrated for the first time Remote Data Services that lets OS/2 Extended Edition users access information on another PS/2. (See story above.) The Remote Data Services facility is intended to allow Extended Edition users to access data residing on IBM mainframes. Reiswig declined to say when Remote Data Services for DOS would be available or how it would be implemented.

Asked if IBM would work with third parties to develop versions of OS/2 Extended Edition for compatible machines, Reiswig indicated that it is a job easier said than done. "That would be quite a complex task. We're not ready to tackle that. We have other priorities."

Some industry observers believe that OS/2 Extended Edition's success depends in part on major OEMs producing compatible versions of the operating system.



NOTES FROM THE FIELD ■ BY ROBERT X. CRINGELY

Cubs Win 3-2; IBM Adds Metaphor to Its Lineup

Comdex — foot-aching Comdex — vanished from my mind completely as I walked into Wrigley Field last Wednesday night for my first-ever night game in the ivy-covered ballpark. Computers are just computers, but baseball is a game.

BASEBALL AS METAPHOR. As the overcast sky faded to black and was replaced by floodlights, 21,000 Chicagoans joined me

in choosing baseball over sanity as we sat in 26-degree weather, freezing our butts off, waiting for the game to begin.

But not all the fans were from Chicago; Pammy and I found ourselves floating in a puddle of merry IBMers, who were using beer for antifreeze. Hopeless optimists, these boys and girls predicted a Big Blue month of May, with the SX machine and Portable Model 70 shipping on May 2. But the line drives

will be hit in the software league, with the 32-bit version of OS/2, SAA Office, the next version of Extended Edition, and a statement on how IBM will use Metaphor technology in Extended Edition.

It turns out the IBM has been vague about Metaphor because the object-oriented technology requires a true 32-bit OS. The only worry in Armonk is whether third-party developers will be up to the challenge of writing for the Metaphor platform, which runs on top of the daunting Presentation Manager.

METAPHOR AS TRIPLE PLAY. The Cubs and Cardinals played their best in this Chicago version of winter baseball, but the cold made the air dead, unable to support a line drive, and made the fingers of the outfielders stupid, incapable of catching. The fat and happy kids from IBM were unbothered by it all and turned to throwing the wonderful cheese-covered Wrigley french fries at each other and at a nearby contingent from Businessland.

If it was any occasion but a baseball game, I would have ended this foolishness by telling the kids about the danger in their Metaphor strategy. Xerox has been pushing Metaphor to buy a license for look and feel supposedly taken from the Xerox Star. Xerox lawyers think that if Metaphor buys the license, then, because of Metaphor's contract with IBM, IBM will have to license it too. Microsoft and HP would eventually have to follow suit, and Apple's claim that it doesn't need a license from Xerox would disappear.

FULLWRONG. By the third inning, Pedro Guerrero was between his first and second errors, while Pammy — a native Californian — was literally crawling into my jacket, trying to stay warm. "I'll warm you up, baby," called a lump of cholesterol, beckoning from the row ahead of us.

Speaking of thoughtful comments, at Intel's 486 announcement, Ashton-Tate's Ed Esber said nice things about the 486's compatibility with existing PC products such as Dbase III Plus, Dbase IV, Fullwrite, and Full Impact. But Fullwrite and Full Impact are *Macintosh* products. There's no Mac emulator built into the 486; Esber flubbed and preannounced a couple products on the way.

FREE AGENTS. By the seventh inning stretch, Pammy had turned blue and I couldn't remember the words to "Take Me Out to the Ballgame," so Harry Caray had to sing without me. It was time to go.

Bob Ano, Graham Beacham, and most of the senior management of Wang Laboratories' Microsystems Division must have felt it was time to hit the showers, too, because I hear they resigned en masse last week, upset that Dr. Wang and son Fred weren't committed to the idea of doing a PC business.

Also about to leave the game, though with much better terms, is Apollo Computer CEO Tom Vandercloot, who will reportedly walk with \$20 million after selling the company to Hewlett-Packard. Data General came very close to buying Apollo before HP came along, but DG president Edson De Castro told Tom to shove it when it became clear that the \$20 million parachute was not a joke. Vandercloot will not be missed, at least not by my techie friends at Apollo.

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